Appendix A

Air Quality and GHG Emissions Assessment

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1150 WALSH AVENUE DATA CENTER

SANTA CLARA, CALIFORNIA

AIR QUALITY AND GHG EMISSIONS ASSESSMENT

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Project 18-075

INTRODUCTION

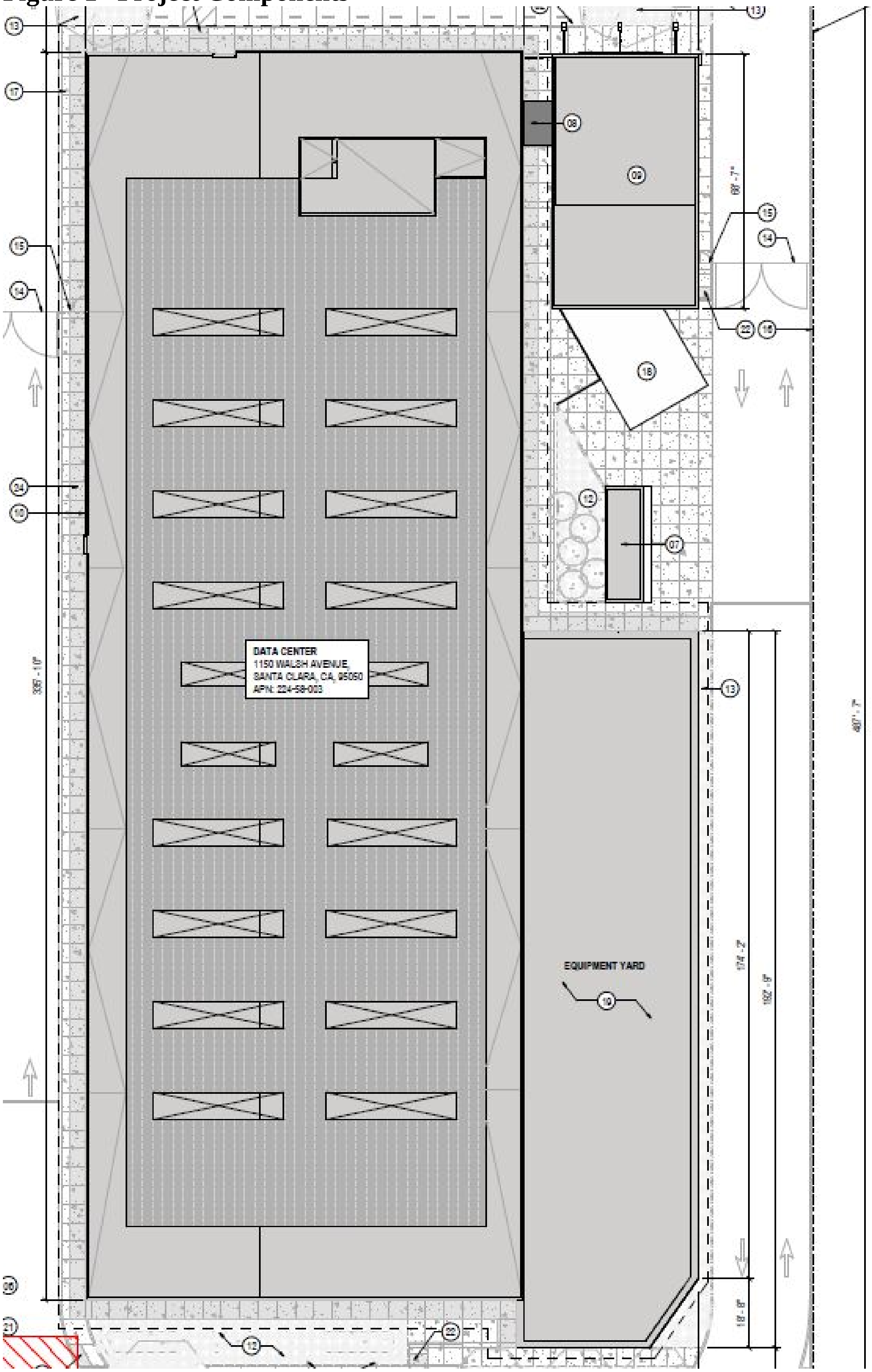
This report provides the results of an assessment of potential air quality impacts and greenhouse gas (GHG) emissions from the proposed 1150 Walsh Avenue Data Center project located west of Norman Y. Mineta San Jose International airport between Scott Boulevard and Lafayette Street in the City of Santa Clara. The proposed project would include a four-story data center building, which will house computer servers for private clients. Emergency generators powered by diesel engines would provide electricity in the event of a power outage. This analysis predicts air quality emissions associated with the project and potential health risks to sensitive receptors. In addition, direct and indirect GHG emissions were modeled.

Project Description

The project site, which is approximately 3.32 acres, is currently developed with three single-story light industrial buildings that are currently vacant. Surface lots are currently used for the storage of unused automobiles as well as car parts. A four-story, 157,465 square-foot (sf) data center would be developed on the project site. *Figure 1* shows the project components.

The four-story data center would not exceed a maximum height of 67 feet. The project includes 27-megawatt (MW) connections to Silicon Valley Power (SVP) service, and 11 backup diesel generators (ten 3,250 kilowatt [kW] standby generators and one 1,000 kW standby generator) that would be included at the site to provide power to the data center in the event of an emergency. The ten 3,250- kW generators would each have 6,500-gallon diesel fuel tanks and one 1,000 kW generator would have a 2000-gallon diesel fuel tank. The generators would sit on top of the fuel tanks and the fuel tanks will be at grade level. The emergency generators and associated equipment would be located in an exterior generator yard on the east side of the data center. The data center rooftop would have 18 chillers. Approximately 74 parking spaces would be provided in surface lots surrounding the building.

Figure 1– Project Components



Air Quality Analysis

The primary source of air pollutant emissions is from operation of the diesel generator engines at the data center during testing and maintenance of emergency generators. During normal facility operation these generator engines will not be operated other than for periodic testing and maintenance requirements. The generators would use diesel-fueled engines that meet U.S. EPA Tier 2 emission standards. The engines would be fueled using ultra low sulfur diesel fuel with a maximum sulfur content of 15 parts per million (ppm), which minimizes both particulate matter and sulfur dioxide (SO_2) emissions. All generator engines would be equipped with diesel particulate filters (DPFs). There would also be emissions from traffic and indirect emissions of GHG from electricity consumption.

This analysis evaluates the potential air quality impacts from construction and operation of the proposed project that includes construction of buildings and substation, and installation and operation of the new backup emergency generators for the data center. The proposed project would establish new sources of particulate matter and gaseous emissions. The air quality impacts were evaluated in terms of construction and operational impacts to air quality with the primary focus on evaluating the effects of future project-related emissions on regional air quality and on local sensitive receptors. This analysis was conducted following guidance provided by the Bay Area Air Quality Management District (BAAQMD).[1] Note that an Authority to Construct and Permit to Operate permit would be required from BAAQMD prior to construction and operation of any project diesel engines, which may require further analysis of air quality impacts.

SETTING

The project is located in Santa Clara County, which is in the San Francisco Bay Area Air Basin. Ambient air quality standards have been established at both the State and federal level. The Bay Area meets all ambient air quality standards with the exception of ground-level ozone, respirable particulate matter (PM_{10}) and fine particulate matter ($PM_{2.5}$).

High ozone levels are caused by the cumulative emissions of reactive organic gases (ROG) and nitrogen oxides (NOx). These precursor pollutants react under certain meteorological conditions to form high ozone levels. Controlling the emissions of these precursor pollutants is the focus of the Bay Area's attempts to reduce ozone levels. The highest ozone levels in the Bay Area occur in the eastern and southern inland valleys that are downwind of air pollutant sources. High ozone levels aggravate respiratory and cardiovascular diseases, reduced lung function, and increase coughing and chest discomfort.

Particulate matter is another problematic air pollutant of the Bay Area. Particulate matter is assessed and measured in terms of respirable particulate matter or particles that have a diameter of 10 micrometers or less (PM_{10}) and fine particulate matter where particles have a diameter of 2.5 micrometers or less ($PM_{2.5}$). Elevated concentrations of PM_{10} and $PM_{2.5}$ are the result of both region-wide (or cumulative) emissions and localized emissions. High particulate matter levels aggravate respiratory and cardiovascular diseases, reduce lung function, increase mortality (e.g., lung cancer), and result in reduced lung function growth in children.

[1] Bay Area Air Quality Management District, 2017. BAAQMD CEQA Air Quality Guidelines. May.

Toxic air contaminants (TAC) are a broad class of compounds known to cause morbidity or mortality (usually because they cause cancer) and include, but are not limited to, the criteria air pollutants listed above. TACs are found in ambient air, especially in urban areas, and are caused by industry, agriculture, fuel combustion, and commercial operations (e.g., dry cleaners). TACs are typically found in low concentrations, even near their source (e.g., diesel particulate matter near a freeway). Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, state, and Federal level.

Diesel exhaust is the predominant TAC in urban air and is estimated to represent about three-quarters of the cancer risk from TACs (based on the Bay Area average). According to the California Air Resources Board (CARB), diesel exhaust is a complex mixture of gases, vapors and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some of the chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs by the CARB, and are listed as carcinogens either under the state's Proposition 65 or under the Federal Hazardous Air Pollutants programs.

CARB and the U.S. EPA have adopted and implemented a number of regulations and emission standards for stationary and mobile sources to reduce emissions of diesel particulate matter (DPM). These include emission standards for off-road diesel engines, including diesel generators, and regulatory programs that affect medium and heavy-duty diesel trucks that represent the bulk of DPM emissions from California highways.

Sensitive Receptors

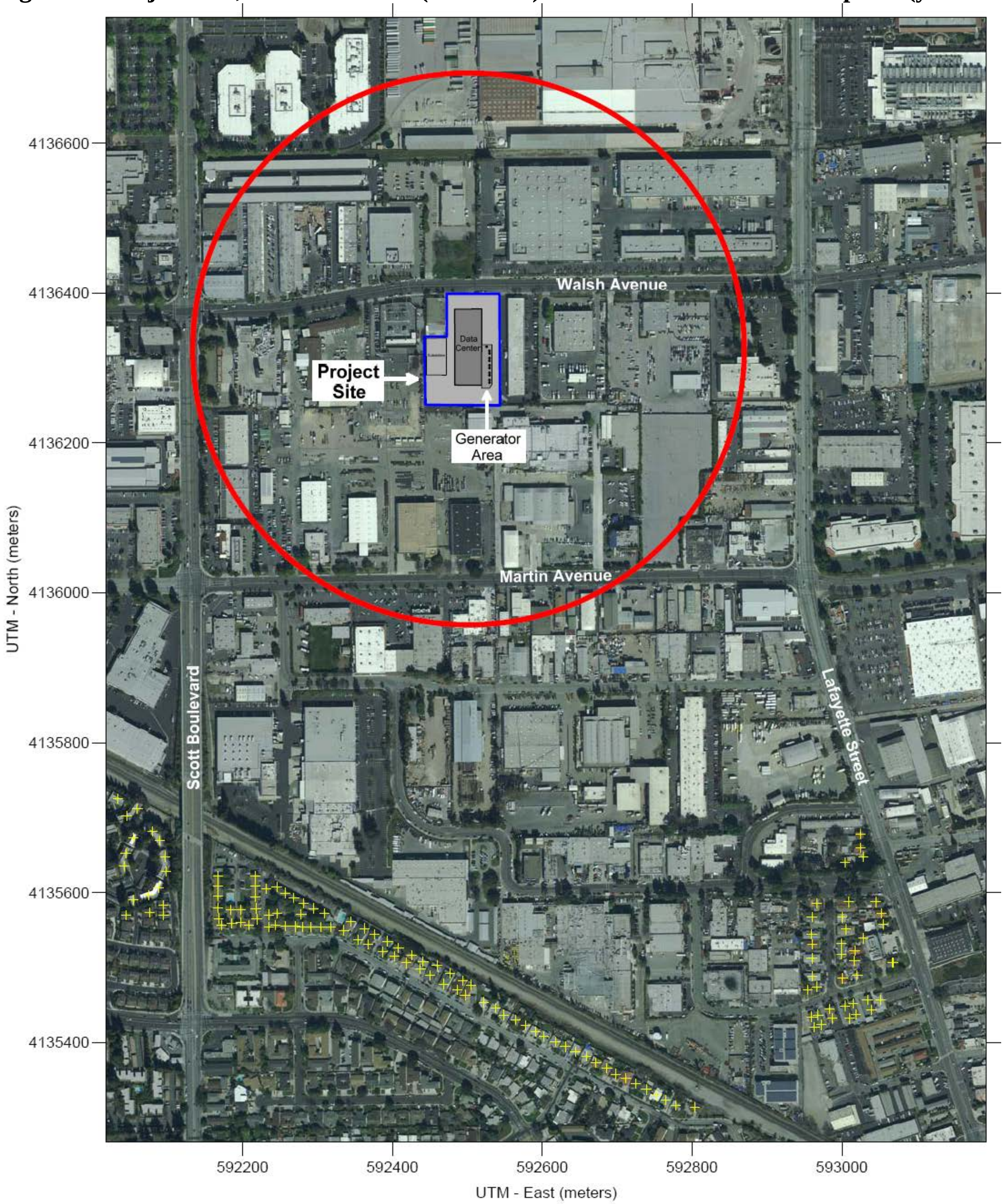
There are groups of people more affected by air pollution than others. CARB has identified the following persons who are most likely to be affected by air pollution: infants, children under 16, the elderly over 65, athletes, and people with cardiovascular and chronic respiratory diseases. These groups are classified as sensitive receptors. Locations that may contain a high concentration of these sensitive population groups include residential areas, hospitals, daycare facilities, elder care facilities, elementary schools, and parks. The closest sensitive receptors to the proposed project site are existing residences about 2,160 feet southwest of the project site, west of Scott Boulevard, and along Lafayette Street about 2,440 feet southeast of the southern project boundary. Figure 2 shows the project setting, a 1,000-foot influence area, and the closest sensitive receptors.

BAAQMD

The Bay Area Air Quality Management District (BAAQMD) is the regional agency tasked with managing air quality in the region. At the State level, the California Air Resources Board (a part of the California Environmental Protection Agency) oversees regional air district activities and regulates air quality at the State level. The BAAQMD has published CEQA Air Quality Guidelines that are used in this assessment to evaluate air quality impacts of projects.[2]

[2] Bay Area Air Quality Management District. 2017. BAAQMD CEQA Air Quality Guidelines. May.

Figure 2– Project Site, Influence Area (red circle) and Nearest Sensitive Receptors (yellow +)



Santa Clara 2010-2035 General Plan

The Santa Clara 2035 General Plan includes goals and policies to reduce exposure of the City's sensitive population to exposure of air pollution and toxic air contaminants or TACs. The following goals, policies, and actions are applicable to the proposed project:

Air Quality Goals

5.10.2-G1 Improved air quality in Santa Clara and the region.
5.10.2-G2 Reduced greenhouse gas emissions that meet the State and regional goals and requirements to combat climate change.

Air Quality Policies

5.10.2-P1 Support alternative transportation modes and efficient parking mechanisms to improve air quality.
5.10.2-P2 Encourage development patterns that reduce vehicle miles traveled and air pollution.
5.10.2-P3 Encourage implementation of technological advances that minimize public health hazards and reduce the generation of air pollutants.
5.10.2-P4 Encourage measures to reduce greenhouse gas emissions to reach 30 percent below 1990 levels by 2020.
5.10.2-P5 Promote regional air pollution prevention plans for local industry and businesses.
5.10.2-P6 Require "Best Management Practices" for construction dust abatement.

Significance Thresholds

In June 2010, BAAQMD adopted thresholds of significance to assist in the review of projects under CEQA. These thresholds were designed to establish the level at which BAAQMD believed air pollution emissions would cause significant environmental impacts under CEQA. The significance thresholds identified by BAAQMD and used in this analysis are summarized in Table 1. The BAAQMD's significance thresholds are described in their latest version of their *BAAQMD CEQA Air Quality Guidelines* issued in May 2017.

Table 1. Air Quality Significance Thresholds

Criteria Air Pollutant	Construction Thresholds	Operational Thresholds	
	Average Daily Emissions (lbs./day)	**Average Daily Emissions (lbs./day)**	**Annual Average Emissions (tons/year)**
ROG	54	54	10
NO_x	54	54	10
PM_{10}	82 (Exhaust)	82	15
$PM_{2.5}$	54 (Exhaust)	54	10
CO	Not Applicable	9.0 ppm (8-hour average) or 20.0 ppm (1-hour average)	
Fugitive Dust	Construction Dust Ordinance or other Best Management Practices	Not Applicable	
Health Risks and Hazards	**Single Sources Within 1,000-foot Zone of Influence**	**Combined Sources (Cumulative from all sources within 1,000-foot zone of influence)**	
Excess Cancer Risk	>10 per one million	>100 per one million	
Hazard Index	>1.0	>10.0	
Incremental annual $PM_{2.5}$	>0.3 $\mu g/m^3$	>0.8 $\mu g/m^3$	
Note: ROG = reactive organic gases, NOx = nitrogen oxides, PM_{10} = course particulate matter or particulates with an aerodynamic diameter of 10 micrometers (µm) or less, $PM_{2.5}$ = fine particulate matter or particulates with an aerodynamic diameter of 2.5µm or less.			

IMPACTS AND MITIGATION

Impact: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

The Bay Area is considered a nonattainment area for ground-level ozone and $PM_{2.5}$ under both the federal Clean Air Act and the California Clean Air Act. The area is also considered non-attainment for PM_{10} under the California Clean Air Act, but not the federal Act. The area has attained both State and federal ambient air quality standards for carbon monoxide. As part of an effort to attain and maintain ambient air quality standards for ozone, PM_{10} and $PM_{2.5}$, BAAQMD has established thresholds of significance for air pollutants. These thresholds are for ozone precursor pollutants (ROG and NOx), PM_{10} and $PM_{2.5}$ and apply to both construction period and operational period impacts.

Both construction and operational emissions were computed using the California Emissions Estimator Model, Version 2016.3.2 (CalEEMod). In addition, emissions from routine testing and maintenance of the standby emergency generators were computed using emissions data published by the emergency generator manufacturer and assuming maximum allowable testing conditions.

Construction Period Emissions

CalEEMod was used to compute annual construction emissions. The construction schedule and projected equipment usage were not provided by the applicant, so CalEEMod defaults were used for a project of this type and size. Inputs to the CalEEMod model are summarized below (CalEEMod output files and provided construction assumptions are included as *Attachment 2* to this report).

<u>Land Uses and Schedule</u>
The land uses input to CalEEMod were 157,740 sf "General Heavy Industry" and a 59-space "Parking Lot" on a 3.32-acre site. Construction is scheduled to begin in March 2019 and be completed in 2021, a total of 25 months. Although, the applicant indicated that the construction schedule would be completed in two phases over a total of 25 months, the construction schedule and projected equipment usage for these phases were not available. Therefore, the CalEEMod defaults was used. This schedule assumed that the entire project was constructed all at once in 6 phases: Demolition, Site Preparation, Grading, Exterior Building Construction, Paving, and Interior Building Construction.

<u>Construction Equipment</u>
CalEEMod default equipment type, quantity, number of days in use, average hours of use per day (of use) were used for a project of this type and size.

<u>Truck and Worker Travel</u>
Worker and vendor travel is based on the CalEEMod default values, which assign a daily rate for each phase. CalEEMod also computes the number of haul trips that are based on the amount of demolition and soil material to be imported or exported from the site. An estimated 144,619 tons of demolition and 13,455 cubic yards (cy) of soil off-haul were entered into CalEEMod based off of the project plans. Default trip lengths were used.

<u>CalEEMod Construction Modeling Results</u>

CalEEMod provided construction emissions in tons per year. Average daily emissions were based on a construction start date of March 2019 and an anticipated construction completion date of April 2020 or 299 workdays. Total and average daily construction emissions from full build out of the project, which is build out of the entire site, are shown in Table 2. As indicated in Table 2, predicted the construction period emissions would not exceed the BAAQMD significance thresholds.

Table 2. Construction Period Emissions

Description	ROG Emissions	NOx Emissions	PM10 Exhaust Emissions	PM2.5 Exhaust Emissions
Total construction emissions (tons)	1.22	3.90	0.19	0.17
Average daily emissions (pounds/day)	*8.16*	*26.09*	*1.27*	*1.14*
BAAQMD Thresholds (pounds/day)	*54*	*54*	*82*	*54*
Significant?	***No***	***No***	***No***	***No***

Note: Average daily emissions were computed by dividing total construction emissions by the number of workdays. Based on the provided construction schedule, this would be at least 299 construction days.

Construction Fugitive Dust

During grading and construction activities, dust would be generated. Most of the dust would result during grading activities. The amount of dust generated would be highly variable and is dependent on the size of the area disturbed at any given time, amount of activity, soil conditions and meteorological conditions. Nearby areas could be adversely affected by dust generated during construction activities. Nearby land uses are primarily commercial and office uses that are separated by roadways or open areas. The BAAQMD CEQA Air Quality Guidelines consider these impacts to be less than significant if best management practices are employed to reduce these emissions. This impact is considered less-than-significant with implementation of *Mitigation Measures AQ-1*.

> *Mitigation Measure AQ-1:* Include basic measures to control dust and exhaust during construction.
>
> During any construction period ground disturbance, the applicant shall ensure that the project contractor implement measures to control dust and exhaust. Implementation of the measures recommended by BAAQMD and listed below would reduce the air quality impacts associated with grading and new construction to a less than significant level. The contractor shall implement the following best management practices that are required of all projects:
>
> 1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
>
> 2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
>
> 3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
>
> 4. All vehicle speeds on unpaved roads shall be limited to 15 miles per hour (mph).
>
> 5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
>
> 6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
>
> 7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.

8. Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

Effectiveness of Mitigation Measure AQ-1: According to the BAAQMD CEQA Air Quality Guidelines, incorporation of these measures would be considered Best Management Practices for controlling fugitive PM10 and $PM_{2.5}$ emissions and the emissions would be considered less than significant as quantified emission thresholds are not used for these types of emissions. The Guidelines also indicate that these measures are anticipated to reduce on-site exhaust emissions by 5 percent.

Operational Emissions

Emissions were computed on an annual basis for the project with land uses input to CalEEMod as described above for the construction period modeling. Table 3 provides a summary of the total operational emissions and the net increase in emissions when accounting for the existing use at the site.

Table 3
Summary of Uncontrolled Operational Emissions in tons/year (average pounds/day*)

Emission Source	Reactive Organic Gases (ROG)	Nitrogen Oxides (NOx)	Respirable Particulates (PM_{10})	Fine Particulates ($PM_{2.5}$)
BAAQMD Threshold	*10 (54)*	*10 (54)*	*15 (82)*	*10 (54)*
Existing uses (144,619 sf autobody shop)	*0.2 (1.1)*	*0.3 (1.6)*	*0.2 (1.1)*	*0.06 (0.3)*
Data Center Mobile & Area	0.8 (4.4)	0.4 (2.2)	0.2 (1.1)	0.06 (0.3)
Emergency Generators (11) - Maximum Emissions Scenario (50 hrs/engine per year at near full load)	0.2 (1.0)	8.8 (47.9)	0.1 (0.6)	0.1 (0.5)
Project -Maximum Allowable	1.0 (5.4)	9.2 (50.1)	0.3 (1.7)	0.2 (0.8)
Net Increase – Maximum Allowable	***0.8 (4.3)***	***8.9 (48.5)***	***0.1 (0.6)***	***0.1 (0.5)***
Significant?	***No***	***No***	***No***	***No***
* Assumes the project operates 365 days per year				

The primary emission sources associated with operation of the proposed project would be from engine operation during testing or maintenance of the 10 diesel-fueled 3,250-kW and one 1,000-kW emergency backup generators. There would also be emissions from traffic and area sources associated with operation of the data center facilities. Emissions from these sources are described below. The ten 3,250-kW generators and the 1,000-kW generator would be housed in individual enclosures located in the generator yard adjacent to the eastern wall of the data center. Each of the 3,250 kW generator units would have a 6,500-gallon diesel fuel tank and the 1,000 kW generator would have a 2000 gallon diesel fuel tank, which would supply enough fuel for each generator to run for 24 hours in the event of a power failure. The 11 generators would have a combined diesel fuel storage capacity of 67,000 gallons. Due to the low volatility of diesel fuel there would be minor evaporative emissions of ROG. Operation of the proposed Substation would result in negligible daily operational emissions. Operational emissions from the substation were assumed to be less than 1 pound per day of each criteria air pollutant and no modeling was conducted.

Area and Mobile Sources

Project related mobile source and area source emissions were modeled using CalEEMod with default conditions for an industrial park type project along with project vehicle traffic projections. The CalEEMod operational model included the Data Center modeled as a 157,470 sf "General Heavy Industry" and a 59-space "Parking Lot" on a 3.32-acre site. A trip generation rate of 0.99 trips per 1,000 sf was used to represent traffic for the data center.

In addition, emissions from the existing use were computed using CalEEMod. The existing use was modeled as a 37,443-sf "General Light Industry" and as a 25 space "Parking Lot" in CalEEMod on a 3.32-acre site.

CalEEMod model output for the operational emissions are contained in *Attachment 2*.

Emergency Generator Emissions

The proposed project would install 10 diesel-fueled 3,250-kW generators and one 1,000-kW emergency backup generator equipped with Cummins engines. During normal facility operation these engines would not be operated other than for periodic testing and maintenance requirements. The generator engines would be fueled using ultra low sulfur diesel fuel with a maximum sulfur content of 15 ppm. The diesel engines would meet U.S. EPA Tier 2 emission standards. All generator engines would be equipped with CARB Level 3 verified diesel particulate filters (DPFs) with a minimum control efficiency of 85 percent removal of particulate matter. The Data Center building and locations of the emergency generators are shown in Figure 3. The generator equipment and operating specifications for the proposed generators are provided in Table 4.

Table 4. Engine Generator Systems Equipment and Operating Information

Description		Value
3,250 kW Cummins Generator Sets C3000 D6e		**Cummins QSK95-G9 diesel engines**
Engine Output (Standby)	at 100% Load	4,703 horsepower
	at 73% Load	3,435 horsepower
Diesel Fuel Consumption	at 100% Load	226 gallons/hour
	at 73% Load	172 gallons/hour
Diesel Fuel Sulfur Content		0.0015% (15 ppm)
Exhaust Flow Rate	at 100% Load	24,590 actual cubic feet/minute
	at 73% Load	20,629 actual cubic feet/minute
Stack Height (above ground level)		30 feet
Stack Inside Diameter		26 inches
Exhaust gas Temperature	at 100% Load	874 ºF
	at 73% Load	741 ºF
1,000 kW Cummins Generator Set 1000QFAD		**Cummins QST30-G5 NR2 diesel engine**
Engine Output (Standby)	at 100% Load	1,482 horsepower
	at 73% Load	1,082 horsepower
Diesel Fuel Consumption	at 100% Load	72.2 gallons/hour
	at 73% Load	54.1 gallons/hour
Diesel Fuel Sulfur Content		0.0015% (15 ppm)
Exhaust Flow Rate	at 100% Load	7,540 actual cubic feet/minute
	at 73% Load	6,370 actual cubic feet/minute
Stack Height (above ground level)		14 feet
Stack Inside Diameter		14 inches
Exhaust gas Temperature	at 100% Load	890 ºF
	at 73% Load	814 ºF

Note: 73% engine load based on default CalEEMod load factor for emergency generators.

The operations of these generators are limited to 50 hours per year of non-emergency use (i.e. testing and maintenance) by the State's Air Toxic Control Measure for Stationary Compression Ignition Engines.[3] The project description includes information on project initiation testing, which would occur upon project start-up, and expected annual engine operation for testing and maintenance. At project initiation, generators would be tested for functionality, and an integrated systems test would be performed to ensure that, in the event of power failure, the building's backup energy system would work correctly. This would include running at least five of the generators simultaneously under full load, and may include running all generators simultaneously with eight under full load and 2 under partial load. The integrated systems test would take place over one day.

The backup generators would have maintenance testing performed throughout the year to ensure performance when needed during a power failure. Generator testing would be biweekly for a duration of 30 minutes under no load. Generator load testing will occur monthly and will run 30 minutes under load. The testing is conducted to make sure that the generators are ready to come online and provide electricity when needed in the event of a power failure. Note that the proposed testing schedule, described above, would require less than 50 hours of generator operation per year. For purposes of estimating emissions and potential air quality impacts from the engines, it

[3] Section 93115, title 17, California Code of Regulations

was assumed that each engine could be operated for 50 hours per year (maximum operation hours allowed by the State's Air Toxic Control Measure and BAAQMD for testing and maintenance) at an average load of 73 percent[4]. Additionally, to provide a conservative estimate of potential health impacts the particulate matter emissions (PM_{10} and $PM_{2.5}$) were estimated assuming operation of the engines without the DPFs in use. These emissions are shown in Table 5. Detailed emissions information is provided in *Attachment 3*.

Table 5. Data Center Engine Testing: 50 Hours per Year per Engine Average Daily and Annual Emissions from Emergency Generators

	Operational – Total Emissions (11 Generators)		
	Average Daily Emissions All 11 units[a] (lb/day)	Total Annual Emissions[b] 50 Hours Operation All 11 units	
Pollutant		(lb/year)	(ton/year)
NOx	47.9	17,500	8.8
ROG	1.0	350	0.2
CO	2.2	815	0.4
PM_{10}	0.6	204	0.1
$PM_{2.5}$	0.5	191	0.1
SO_x	0.1	19	0.01
CO_2	5,438	1,984,924	992

[a] Average daily emissions calculated from total annual emissions and 365 days per year.
[b] Assumes operation at 73% engine load for 50 hours/year per engine.

Diesel Fuel Storage Emissions

Diesel fuel for each emergency generator would be stored in tanks, which would supply enough fuel for each generator to run for 24 hours in the event of a power failure. The generators would sit on top of the fuel tanks and the fuel tanks would be on grade level. Diesel fuel has a very low volatility and emissions of ROG from fuel storage are expected to be negligible

Total Project Emissions

Total daily and annual emissions from the emergency generators, mobile and area sources are summarized in Table 3. Total increased average daily and annual emissions from operation of the project are modeled to be below the significance thresholds established by the The impact is considered *less-than-significant*.

[4] CalEEMod assigns standby generators a load factor of 0.73.

Impact: Violate any air quality standard or contribute substantially to an existing or projected air quality violation?

The proposed project includes operation of the diesel generators for routine testing and maintenance purposes. The project would not cause a cumulatively considerable net increase in ozone precursor or particulate matter emissions, and therefore, the project is not expected to cause or substantially contribute to a violation of ambient air quality standards for those pollutants.

Testing of generators would have NOx emissions; however, emissions would be relatively low due to the limited number of hours that each emergency generator would be operated for testing and maintenance purposes. With intermittent operation of the engines for testing and maintenance, the potential air quality impacts are not expected to cause or substantially contribute to a violation of ambient air quality standards. Air quality dispersion modeling is not recommended by the EPA for evaluating potential 1-hour NO_2 impacts from intermittent emission sources, such as emergency generators, that operate less than 500 hours per year.[5]

The Bay Area is an attainment area for CO due to the low ambient levels. The project would generate a relatively low amount of CO emissions, well below the 550 pounds per average day used to identify the need for dispersion modeling to assess CO emissions. Therefore, the project would not cause or contribute to exceedances of CO ambient air quality standards.

The proposed project would not cause or contribute to a violation of an ambient air quality standard and the impact is considered *less than significant*

Impact: Expose sensitive receptors to substantial pollutant concentrations from construction activities and operation?

The proposed project would be a source of air pollutant emissions during project construction and then from operation of emergency generators for testing and maintenance purposes. These generators are diesel-fueled, so they emit DPM, which is a toxic air contaminant (TAC). The generators are also a source of $PM_{2.5}$, which has known adverse health effects.

The BAAQMD CEQA Air Quality Guidelines considers exposure of sensitive receptors to air pollutant levels that result in an unacceptable cancer risk or hazard to be significant. BAAQMD recommends a 1,000-foot zone of influence around project boundaries, as shown in Figure 2. Since construction activities are temporary and would occur well over 1,000 feet from the nearest sensitive receptor community risk impacts from construction activities would be *less than significant*.

Since the proposed project would emit DPM from the generator engines over the project lifetime, an analysis was performed to assess what ambient concentrations would result from their operation and to quantify potential long-term health risks at the closest sensitive receptors.

Potential health impacts from operation of the project's generators for testing and maintenance purposes were evaluated using air quality dispersion modeling and applying BAAQMD

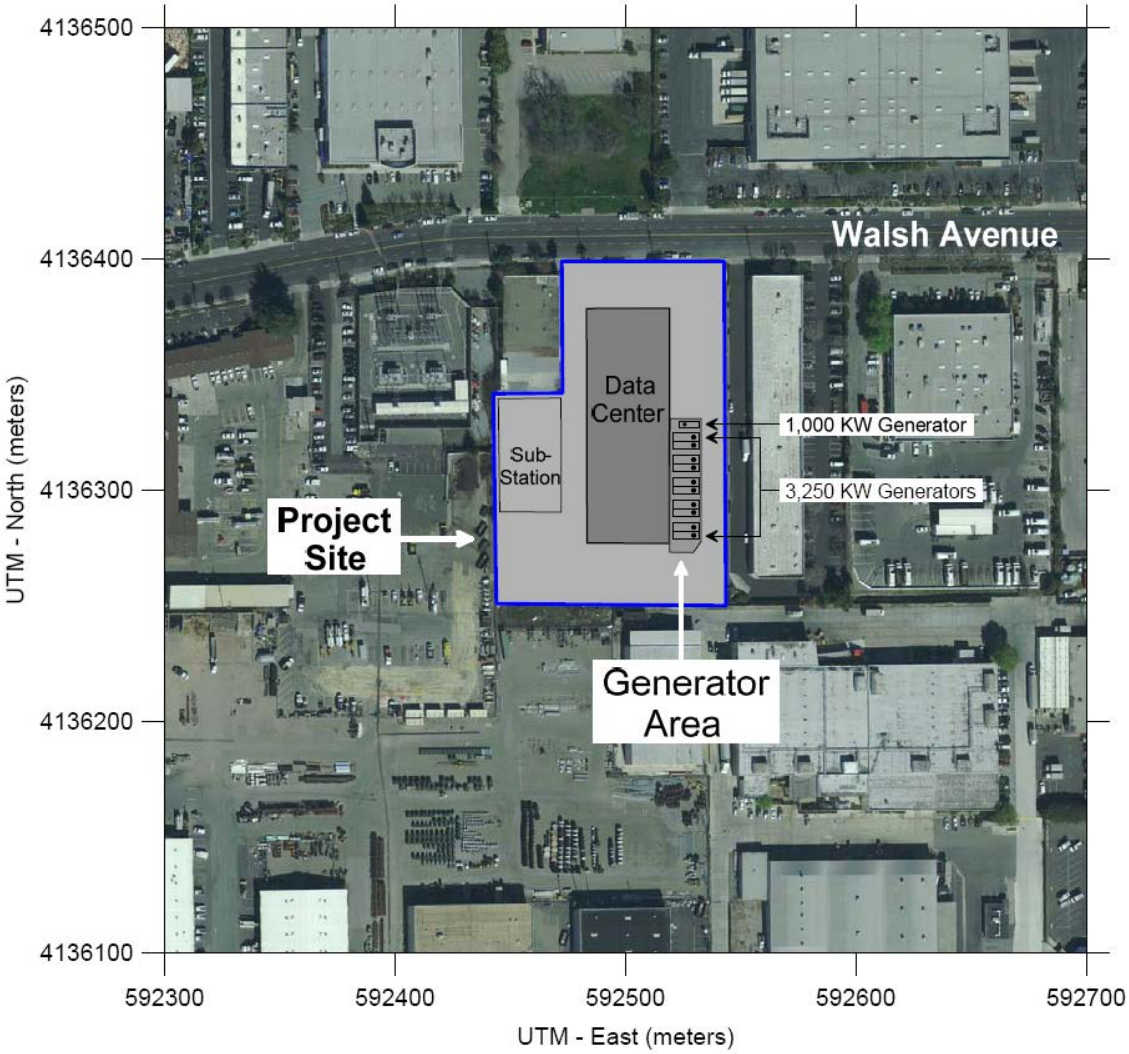
[5] *Additional Clarification Regarding Application of Appendix W modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard*. March 11, 2011. U.S. EPA.

recommended health impact calculation methods, as described in *Attachment 1*. DPM concentrations and potential cancer risks from operation of the generators were evaluated at existing residences in the vicinity of the proposed data center site. Figure 3 shows the proposed data center buildings and locations of project emergency generators at the project site and Figure 4 shows the data center sit and the receptors used to represent the locations of off-site residential receptors. The closest receptors to the project site are existing residences about 2,160 feet southwest of the project site, west of Scott Boulevard, and along Lafayette Street about 2,440 feet southeast of the southern project boundary. The maximum average annual off-site DPM concentrations were used to calculate potential increased cancer risks from the project. Average annual DPM concentrations were used as being representative of long-term (30-year) exposures for calculation of cancer risks.

Air quality modeling of annual average DPM concentrations was conducted using the EPA's AERMOD dispersion model. The AERMOD model is a steady-state, multiple-source, dispersion model designed to calculate pollutant concentrations from single or multiple sources. The model is recommended by BAAQMD for predicting air pollutant/contaminant concentrations associated with various emissions sources. The AERMOD model predicts pollutant concentrations at receptors located in areas of flat or complex terrain from a variety of emission source types including point, area, volume and line sources. Although there are only small elevation differences in the topography in the vicinity of the project site and sensitive receptor locations, the effect of terrain elevation was included in the evaluation. The land use classification of the area was assumed to be urban. The modeling used a 5-year meteorological data set (2006-2010) from the San José Airport prepared for use with the AERMOD model by the BAAQMD. The meteorological monitoring station is within one mile of the project site.

Annual average DPM and $PM_{2.5}$ concentrations were modeled assuming that generator testing could occur at any hour of the day and each generator is operated for 50 hours per year. The generator engine source parameters used in the modeling are listed in Table 4. DPM emissions for the proposed emergency generators were assumed to be the total PM_{10} exhaust emissions. As a worst-case analysis, each generator was assumed to operate without a DPF and for 50 hours per year, even though the testing schedule indicates less operation.

Figure 3. Data Center and Emission Sources

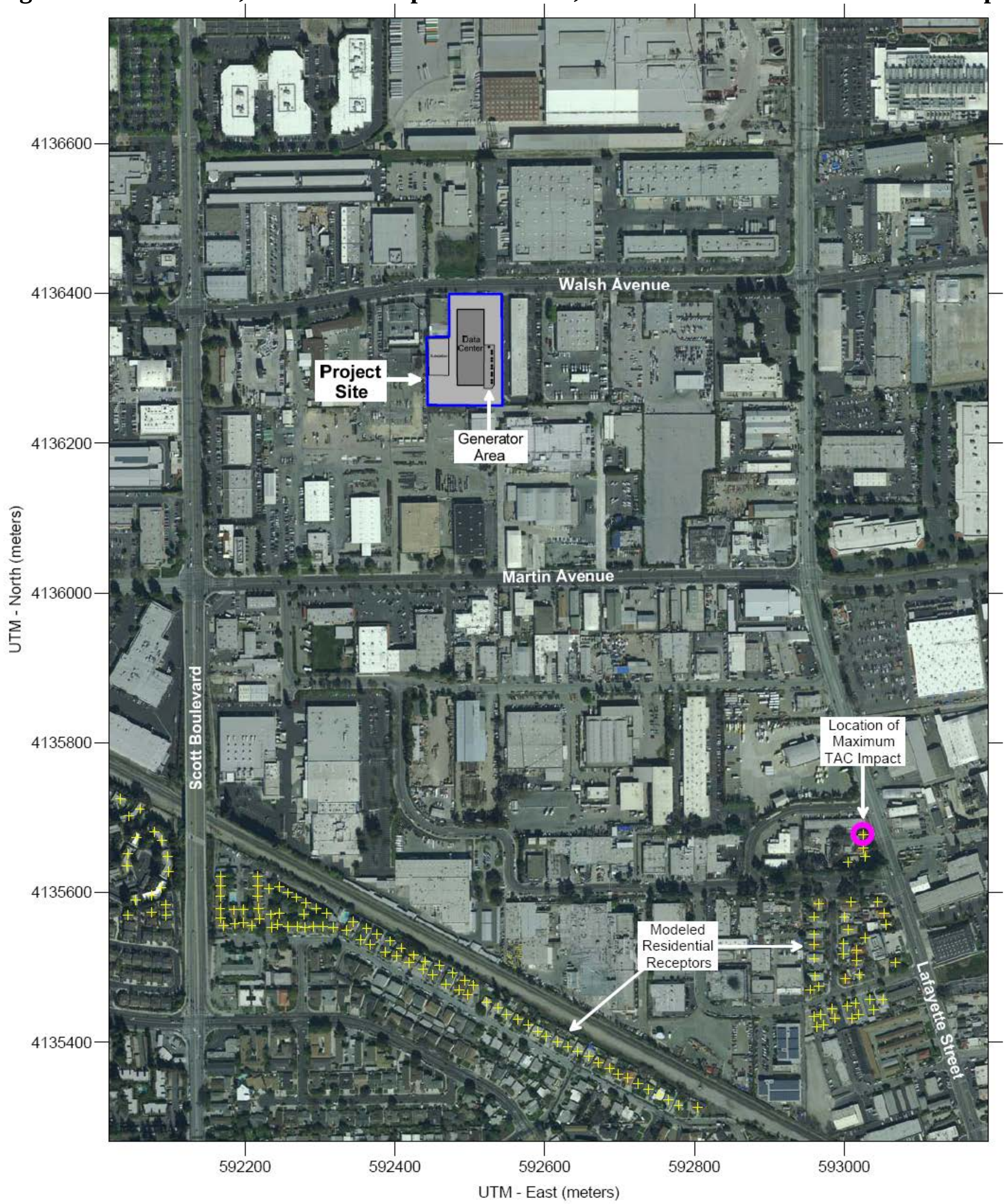


DPM and $PM_{2.5}$ concentrations were calculated at the locations of existing nearby residences, as shown in Figure 4. Annual DPM and $PM_{2.5}$ concentrations from project operation were calculated at a receptor height of 1.5 meters (4.9 feet), representative of breathing heights for residents at ground level.

The maximum modeled annual DPM and $PM_{2.5}$ concentration from operation of the generators at the data center was 0.0027 $\mu g/m^3$ at a residential receptor southeast of the project site on Lafayette Street. Concentrations at all other existing residential locations would be lower then the maximum concentration. The location of the maximum modeled concentration, and TAC impacts, are shown on Figure 4.

Based on the maximum modeled DPM concentrations that assume operation for 50 hours per year per generator, maximum increased cancer risks and non-cancer health impacts were calculated using BAAQMD recommended methods, as described in *Attachment 1*. The maximum increased cancer risk would be 2.0 in one million and the maximum hazard index would be less than 0.01 from operation of the proposed emergency generators and would be below the BAAQMD significance thresholds and would be considered a *less than significant impact*. Details of the modeling and cancer risk calculations are included in *Attachment 4*.

Figure 4. Data Center, Sensitive Receptor Locations, and Location of Maximum TAC Impact



GREENHOUSE GASES

Setting

Gases that trap heat in the atmosphere, GHGs, regulate the earth's temperature. This phenomenon, known as the greenhouse effect, is responsible for maintaining a habitable climate. The most common GHGs are carbon dioxide (CO_2) and water vapor but there are also several others, most importantly methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). These are released into the earth's atmosphere through a variety of natural processes and human activities. Sources of GHGs are generally as follows:

- CO_2 and N_2O are byproducts of fossil fuel combustion.
- N_2O is associated with agricultural operations such as fertilization of crops.
  CH_4 is commonly created by off-gassing from agricultural practices (e.g., keeping livestock) and landfill operations.
- Chlorofluorocarbons (CFCs) were widely used as refrigerants, propellants, and cleaning solvents but their production has been stopped by international treaty.
- HFCs are now used as a substitute for CFCs in refrigeration and cooling.
- PFCs and sulfur hexafluoride emissions are commonly created by industries such as aluminum production and semi-conductor manufacturing.

Each GHG has its own potency and effect upon the earth's energy balance. This is expressed in terms of a global warming potential (GWP), with CO_2 being assigned a value of 1 and sulfur hexafluoride being several orders of magnitude stronger. In GHG emission inventories, the weight of each gas is multiplied by its GWP and is measured in units of CO_2 equivalents (CO_2e).

An expanding body of scientific research supports the theory that global climate change is currently affecting changes in weather patterns, average sea level, ocean acidification, chemical reaction rates, and precipitation rates, and that it will increasingly do so in the future. The climate and several naturally occurring resources within California are adversely affected by the global warming trend. Increased precipitation and sea level rise will increase coastal flooding, saltwater intrusion, and degradation of wetlands. Mass migration and/or loss of plant and animal species could also occur. Potential effects of global climate change that could adversely affect human health include more extreme heat waves and heat-related stress; an increase in climate-sensitive diseases; more frequent and intense natural disasters such as flooding, hurricanes and drought; and increased levels of air pollution.

Greenhouse gas (GHG) emissions associated with the project were computed on an annual basis. GHG emission sources analyzed include construction, operation, indirect emissions from electrical use, and indirect emissions from water consumption. GHG emissions are reported in Table 10.

Table 10. Annual GHG Emissions (in metric tons)

Source	2008 Statewide Average Rate	2016 Statewide Average Rate	2017 Project using SVP Rate	2020 Project using SVP Rate	2030 Project using SVP Rate
Construction Emissions	**589**	**589**	**589**	**589**	**589**
Operational Emissions					
Energy	**87,996**	**52,106**	**37,420**	**30,864**	**19,587**
Mobile	**176**	**176**	**176**	**176**	**132**
Waste	**98**	**98**	**98**	**98**	**98**
Water/Wastewater	**<1**	**<1**	**<1**	**<1**	**<1**
Total Operational GHG Emissions	**88,271**	**52,380**	**37,694**	**31,138**	**19,818**
				65% lower than 2008 Statewide 41% lower than 2016 Statewide	**78% lower than 2008 Statewide 62% lower than 2016 Statewide**
Generator Testing	**873**	**873**	**873**	**873**	**873**
Notes	***CalEEMod default statewide emission rate***	***Computed statewide 2016 emission rate***	***Using SVP 2017 reported emission rate***	***Using SVP 2020 projected emission rate***	***Using SVP 2030 projected emission rate***

Construction Emissions

Construction emissions were computed based on results of the CalEEMod modeling described under Impact 1 of the Air Quality Analysis.

Energy Usage

Energy usage includes direct emissions from natural gas usage and indirect emissions from electricity consumption. Natural gas consumption, which is expected to be fairly small, was based on CalEEMod default conditions for a "General Heavy Industry" land use project that is 157,470 sf.

Electricity use is based on the design for annual demand of 22 megawatts (mW), which would equate to 192,720 mW hours per year.

Emissions rates associated with electricity consumption were applied to the project. Silicon Valley Power (SVP) is the provider of electricity to the project. As of 2017, SVP emits 423 pounds of carbon dioxide (CO_2) per MW of electricity provided.[6] The City's Climate Action Plan includes goals and policies to reduce GHG emission associated with SVP's electricity generation:

Goal: Eliminate coal from SVP's portfolio and increase use of natural gas and renewable energy

Policies: *Replace the use of coal in Silicon Valley Power's portfolio with natural gas by 2020.*

This is anticipated to reduce SVP's emission rate by 40 percent. Other Climate Action Plan measures would be in place to reduce the 2021 rate. Other measures would increase the amount of renewable energy sources

[6] Hughes, Kathleen 2018. Personal communication with Diana Fazely and Alexander Abbe. Email.

and increase energy efficiency to reduce emission from electricity generation. Note that SVP's strategic Plan states that SVP completely divested from coal-powered energy sources by December of 2017[7]. SVP's carbon intensity rate was updated to reflect the current sources of electricity and future rates[8]. Table 10 compares these emissions to those that would occur under the CalEEMod model default "Statewide" emission rate to generate and deliver electricity. SVP reports the 2020 rate at 348 lbs/megawatt hour (mWh) and 219 pounds per mWh in 2030. The year 2008 is provided to show the default conditions using CalEEMod and the year 2017 is based on the latest available information from the SVP.[9] The carbon intensity based on the most recent 2017 information was 0.192 MT CO_{2e}/MWh or 423 pounds of CO_{2e}/MWh.

Mobile Emissions

Traffic-related emissions are based on the traffic trip generation rates of 0.99 daily trips per 1,000 sf and the model default travel assumptions.

Water Usage/ Wastewater Generation

The project is anticipated to have an annual demand of 174,000 gallons of water per day. Some of this water would evaporate, but for calculation purposes, this volume of water was assumed to be wastewater also.

Solid Waste

These emissions would be minor and were based on the model default conditions.

Generator Emissions

Emissions from generator operation would be associated with diesel fuel combustion. Assuming 50 hours per year of operation along with the fuel consumption rate (per hour) of each generator, the total annual GHG emissions would be 873 MT.

Climate Action Plan Consistency

The City's *Climate Action Plan* (CAP) recommends a citywide GHG reduction target of 15% below the 2008 baseline level by 2020. The City's (CAP) includes numerous measures to reduce GHG emission throughout the community that would exceed the target. Data Centers in the city are indirect sources of GHG through electricity use. Increasing energy efficiency with these facilities is a measure to reduce GHG emissions. The CAP identifies measures to close the local emissions reduction gap and achieve an emissions reduction target consistent with AB 32. This approach is divided into several focus areas that are related to the project.

Focus Area 1: *Coal-Free and Large Renewables*
Goal: *Eliminate coal from SVP's portfolio and increase use of natural gas and renewable energy.*

As described above, reducing the rate of emissions associated with electricity production is a measure in the CAP. By switching to fossil fuels from coal to natural gas is a short-term strategy that will reduce SVPs

[7] SVP 2018. *Final – 2018 Strategic Plan - Valley Power*. December 4.
[8] Hughes, Kathleen 2019. Personal communication with Diana Fazely and Alexander Abbe. Email dated February 6.
[9] Hughes, Kathleen 2018. Personal communication with Diana Fazely and Alexander Abbe. Email.

emissions substantially. Other measures include the installation of renewable sources both sponsored by the City or utilities. Because data centers consume high rates of electricity, reducing emissions from electricity production indirectly reduces the GHG emissions from these types of projects.

Focus Area 2: Energy Efficiency Programs
Goal: Maximize the efficient use of energy throughout the community

The CAP identifies energy efficiency as a means to reducing GHG emissions from data center projects, such as this one. According to the CAP, data centers constitute a large portion of the electricity used in Santa Clara. On average, 28% of total electricity consumed in the community is used by data centers. Recognizing both the economic benefit and the climate effects of data centers is an essential part of this CAP. To respond to the effects of this electricity use, the City requires new data centers with an average rack power rating of 15 kW or more to complete a feasibility study identifying techniques to achieve a power usage effectiveness (PUE) rating of 1.2 or lower.

Attachment 1: Health Risk Calculation Methodology

A health risk assessment (HRA) for exposure to Toxic Air Contaminates (TACs) requires the application of a risk characterization model to the results from the air dispersion model to estimate potential health risk at each sensitive receptor location. The State of California Office of Environmental Health Hazard Assessment (OEHHA) and California Air Resources Board (CARB) develop recommended methods for conducting health risk assessments. The most recent OEHHA risk assessment guidelines were published in February of 2015.[10] These guidelines incorporate substantial changes designed to provide for enhanced protection of children, as required by State law, compared to previous published risk assessment guidelines. CARB has provided additional guidance on implementing OEHHA's recommended methods.[11] This HRA used the recent 2015 OEHHA risk assessment guidelines and CARB guidance. The BAAQMD has adopted recommended procedures for applying the newest OEHHA guidelines as part of Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants.[12] Exposure parameters from the OEHHA guidelines and the recent BAAQMD HRA Guidelines were used in this evaluation.

Cancer Risk

Potential increased cancer risk from inhalation of TACs are calculated based on the TAC concentration over the period of exposure, inhalation dose, the TAC cancer potency factor, and an age sensitivity factor to reflect the greater sensitivity of infants and children to cancer causing TACs. The inhalation dose depends on a person's breathing rate, exposure time and frequency of exposure, and the exposure duration. These parameters vary depending on the age, or age range, of the persons being exposed and whether the exposure is considered to occur at a residential location or other sensitive receptor location.

The current OEHHA guidance recommends that cancer risk be calculated by age groups to account for different breathing rates and sensitivity to TACs. Specifically, they recommend evaluating risks for the third trimester of pregnancy to age zero, ages zero to less than two (infant exposure), ages two to less than 16 (child exposure), and ages 16 to 70 (adult exposure). Age sensitivity factors (ASFs) associated with the different types of exposure are an ASF of 10 for the third trimester and infant exposures, an ASF of 3 for a child exposure, and an ASF of 1 for an adult exposure. Also associated with each exposure type are different breathing rates, expressed as liters per kilogram of body weight per day (L/kg-day). As recommended by the BAAQMD, 95^{th} percentile breathing rates are used for the third trimester and infant exposures, and 80^{th} percentile breathing rates for child and adult exposures. Additionally, CARB and the BAAQMD recommend the use of a residential exposure duration of 30 years for sources with long-term emissions (e.g., roadways).

Under previous OEHHA and BAAQMD HRA guidance, residential receptors are assumed to be at their home 24 hours a day, or 100 percent of the time. In the 2015 Risk Assessment Guidance, OEHHA includes adjustments to exposure duration to account for the fraction of time at home (FAH), which can be less than 100 percent of the time, based on updated population and activity statistics. The FAH factors are age-specific and are: 0.85 for third trimester of pregnancy to less than 2 years old, 0.72 for ages 2 to less than 16 years, and 0.73 for ages 16 to 70 years. Use of the FAH factors is allowed by the BAAQMD if there are no schools in the project vicinity that would have a cancer risk of one in a million or greater assuming 100 percent exposure (FAH = 1.0).

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[10] OEHHA, 2015. *Air Toxics Hot Spots Program Risk Assessment Guidelines, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*. Office of Environmental Health Hazard Assessment. February.
[11] CARB, 2015. *Risk Management Guidance for Stationary Sources of Air Toxics*. July 23.
[12] BAAQMD, 2016. *BAAQMD Air Toxics NSR Program Health Risk Assessment (HRA) Guidelines*. December 2016.

Functionally, cancer risk is calculated using the following parameters and formulas:

Cancer Risk (per million) = *CPF x Inhalation Dose x ASF x ED/AT x FAH x* 10^6

Where:

CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} *x DBR x A x (EF/365) x* 10^{-6}

Where:

C_{air} = concentration in air $(\mu g/m^3)$
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

The health risk parameters used in this evaluation are summarized as follows:

Parameter	***Exposure Type →***	**Infant**		**Child**		**Adult**
	Age Range →	**3rd Trimester**	**0<2**	**2 < 9**	**2 < 16**	**16 - 30**
DPM Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$		1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
Daily Breathing Rate (L/kg-day)*		361	1,090	631	572	261
Inhalation Absorption Factor		1	1	1	1	1
Averaging Time (years)		70	70	70	70	70
Exposure Duration (years)		0.25	2	14	14	14
Exposure Frequency (days/year)		350	350	350	350	350
Age Sensitivity Factor		10	10	3	3	1
Fraction of Time at Home		0.85-1.0	0.85-1.0	0.72-1.0	0.72-1.0	0.73

* 95th percentile breathing rates for 3rd trimester and infants and 80th percentile for children and adults

Non-Cancer Hazards

Potential non-cancer health hazards from TAC exposure are expressed in terms of a hazard index (HI), which is the ratio of the TAC concentration to a reference exposure level (REL). OEHHA has defined acceptable concentration levels for contaminants that pose non-cancer health hazards. TAC concentrations below the REL are not expected to cause adverse health impacts, even for sensitive individuals. The total HI is calculated as the sum of the HIs for each TAC evaluated and the total HI is compared to the BAAQMD significance thresholds to determine whether a significant non-cancer health impact from a project would occur.

Typically, for residential projects located near roadways with substantial TAC emissions, the primary TAC of concern with non-cancer health effects is diesel particulate matter (DPM). For DPM, the chronic inhalation REL is 5 micrograms per cubic meter $(\mu g/m^3)$.

Annual $PM_{2.5}$ Concentrations

While not a TAC, fine particulate matter $(PM_{2.5})$ has been identified by the BAAQMD as a pollutant with potential non-cancer health effects that should be included when evaluating potential community health impacts under the California Environmental Quality Act (CEQA). The thresholds of significance for $PM_{2.5}$

(project level and cumulative) are in terms of an increase in the annual average concentration. When considering $PM_{2.5}$ impacts, the contribution from all sources of $PM_{2.5}$ emissions should be included. For projects with potential impacts from nearby local roadways, the $PM_{2.5}$ impacts should include those from vehicle exhaust emissions, $PM_{2.5}$ generated from vehicle tire and brake wear, and fugitive emissions from re-suspended dust on the roads.

Attachment 2: CalEEMod Construction and Operational Emissions Output

1150 Walsh Ave Data Center

Santa Clara County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Heavy Industry	157.47	1000sqft	2.79	157,470.00	0
Parking Lot	59.00	Space	0.53	23,600.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	58
Climate Zone	4			**Operational Year**	2020
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	348	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - SVP rate in 2020

Land Use - 157,465 sqft and 59 parking spaces from updated project description. 3.32 acres total

Construction Phase - Default Construction schedule

Off-road Equipment - Default Off-road equipment usage

Trips and VMT - TAC trips = 1 mile

Demolition - Building site is 3.32 acres = 144,619...re-doing a majority of the area

Grading - 13,455 cy off-baul based on James' email, default acreage

Vehicle Trips - Trip Generation rate: 0.99

Energy Use - 22MW/hr, square feet used 144,619.2

Water And Wastewater - 100% aerobic, equal volume for water 173,752

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblEnergyUse	LightingElect	3.08	0.00

tblEnergyUse	NT24E	3.70	1,223.80
tblEnergyUse	T24E	1.48	0.00
tblGrading	MaterialExported	0.00	13,455.00
tblLandUse	LotAcreage	3.62	2.79
tblProjectCharacteristics	CO2IntensityFactor	641.35	348
tblVehicleTrips	ST_TR	1.50	0.99
tblVehicleTrips	SU_TR	1.50	0.99
tblVehicleTrips	WD_TR	1.50	0.99
tblWater	AerobicPercent	87.46	100.00
tblWater	AerobicPercent	87.46	100.00
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	0.00
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	0.00
tblWater	IndoorWaterUseRate	36,414,937.50	173,752.00
tblWater	SepticTankPercent	10.33	0.00
tblWater	SepticTankPercent	10.33	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.3254	3.2693	2.2981	5.3500e-003	0.2392	0.1531	0.3923	0.0753	0.1436	0.2189	0.0000	485.6059	485.6059	0.0779	0.0000	487.5540
2020	0.8967	0.6347	0.5773	1.1400e-003	0.0205	0.0325	0.0530	5.5600e-003	0.0305	0.0361	0.0000	100.5654	100.5654	0.0187	0.0000	101.0321
Maximum	**0.8967**	**3.2693**	**2.2981**	**5.3500e-003**	**0.2392**	**0.1531**	**0.3923**	**0.0753**	**0.1436**	**0.2189**	**0.0000**	**485.6059**	**485.6059**	**0.0779**	**0.0000**	**487.5540**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.3254	3.2693	2.2981	5.3500e-003	0.2392	0.1531	0.3923	0.0753	0.1436	0.2189	0.0000	485.6056	485.6056	0.0779	0.0000	487.5537
2020	0.8967	0.6347	0.5773	1.1400e-003	0.0205	0.0325	0.0530	5.5600e-003	0.0305	0.0361	0.0000	100.5653	100.5653	0.0187	0.0000	101.0320
Maximum	**0.8967**	**3.2693**	**2.2981**	**5.3500e-003**	**0.2392**	**0.1531**	**0.3923**	**0.0753**	**0.1436**	**0.2189**	**0.0000**	**485.6056**	**485.6056**	**0.0779**	**0.0000**	**487.5537**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**3-1-2019**	**5-31-2019**	1.4875	1.4875
2	**6-1-2019**	**8-31-2019**	0.9132	0.9132
3	**9-1-2019**	**11-30-2019**	0.9058	0.9058
4	**12-1-2019**	**2-29-2020**	0.8516	0.8516
5	**3-1-2020**	**5-31-2020**	1.0111	1.0111

		Highest	1.4875	1.4875

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.6993	2.0000e-005	2.0000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.8700e-003	3.8700e-003	1.0000e-005	0.0000	4.1300e-003
Energy	0.0224	0.2036	0.1711	1.2200e-003		0.0155	0.0155		0.0155	0.0155	0.0000	30,642.5636	30,642.5636	2.5393	0.5286	30,863.5581
Mobile	0.0462	0.2034	0.5909	1.9200e-003	0.1693	1.9100e-003	0.1712	0.0453	1.7900e-003	0.0471	0.0000	175.6719	175.6719	6.1000e-003	0.0000	175.8243
Waste						0.0000	0.0000		0.0000	0.0000	39.6360	0.0000	39.6360	2.3424	0.0000	98.1966
Water						0.0000	0.0000		0.0000	0.0000	0.0615	0.1484	0.2099	2.2000e-004	1.4000e-004	0.2561
Total	**0.7680**	**0.4071**	**0.7640**	**3.1400e-003**	**0.1693**	**0.0174**	**0.1867**	**0.0453**	**0.0173**	**0.0626**	**39.6975**	**30,818.3878**	**30,858.0852**	**4.8881**	**0.5287**	**31,137.8392**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.6993	2.0000e-005	2.0000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.8700e-003	3.8700e-003	1.0000e-005	0.0000	4.1300e-003
Energy	0.0224	0.2036	0.1711	1.2200e-003		0.0155	0.0155		0.0155	0.0155	0.0000	30,642.5636	30,642.5636	2.5393	0.5286	30,863.5581
Mobile	0.0462	0.2034	0.5909	1.9200e-003	0.1693	1.9100e-003	0.1712	0.0453	1.7900e-003	0.0471	0.0000	175.6719	175.6719	6.1000e-003	0.0000	175.8243
Waste						0.0000	0.0000		0.0000	0.0000	39.6360	0.0000	39.6360	2.3424	0.0000	98.1966
Water						0.0000	0.0000		0.0000	0.0000	0.0615	0.1484	0.2099	2.2000e-004	1.4000e-004	0.2561

Total	0.7680	0.4071	0.7640	3.1400e-003	0.1693	0.0174	0.1867	0.0453	0.0173	0.0626	39.6975	30,818.3878	30,858.0852	4.8881	0.5287	31,137.8392

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	3/1/2019	3/28/2019	5	20	
2	Site Preparation	Site Preparation	3/29/2019	4/4/2019	5	5	
3	Grading	Grading	4/5/2019	4/16/2019	5	8	
4	Building Construction	Building Construction	4/17/2019	3/3/2020	5	230	
5	Paving	Paving	3/4/2020	3/27/2020	5	18	
6	Architectural Coating	Architectural Coating	3/28/2020	4/22/2020	5	18	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 0.53

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 236,205; Non-Residential Outdoor: 78,735; Striped Parking Area: 1,416 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45

Paving	Cement and Mortar Mixers	2	6.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	2	6.00	132	0.36
Paving	Rollers	2	6.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

<u>Trips and VMT</u>

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	658.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	1,682.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	76.00	30.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

<u>Unmitigated Construction On-Site</u>

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0712	0.0000	0.0712	0.0108	0.0000	0.0108	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0351	0.3578	0.2206	3.9000e-004		0.0180	0.0180		0.0167	0.0167	0.0000	34.6263	34.6263	9.6300e-003	0.0000	34.8672
Total	**0.0351**	**0.3578**	**0.2206**	**3.9000e-004**	**0.0712**	**0.0180**	**0.0891**	**0.0108**	**0.0167**	**0.0275**	**0.0000**	**34.6263**	**34.6263**	**9.6300e-003**	**0.0000**	**34.8672**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	2.9900e-003	0.1024	0.0202	2.6000e-004	5.5800e-003	3.9000e-004	5.9700e-003	1.5300e-003	3.8000e-004	1.9100e-003	0.0000	25.3542	25.3542	1.1900e-003	0.0000	25.3839
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.4000e-004	4.1000e-004	4.1900e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.2000e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	1.0531	1.0531	3.0000e-005	0.0000	1.0538
Total	**3.5300e-003**	**0.1028**	**0.0244**	**2.7000e-004**	**6.7700e-003**	**4.0000e-004**	**7.1700e-003**	**1.8500e-003**	**3.9000e-004**	**2.2300e-003**	**0.0000**	**26.4073**	**26.4073**	**1.2200e-003**	**0.0000**	**26.4378**

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Fugitive Dust					0.0712	0.0000	0.0712	0.0108	0.0000	0.0108	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0351	0.3578	0.2206	3.9000e-004		0.0180	0.0180		0.0167	0.0167	0.0000	34.6263	34.6263	9.6300e-003	0.0000	34.8671
Total	**0.0351**	**0.3578**	**0.2206**	**3.9000e-004**	**0.0712**	**0.0180**	**0.0891**	**0.0108**	**0.0167**	**0.0275**	**0.0000**	**34.6263**	**34.6263**	**9.6300e-003**	**0.0000**	**34.8671**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.9900e-003	0.1024	0.0202	2.6000e-004	5.5800e-003	3.9000e-004	5.9700e-003	1.5300e-003	3.8000e-004	1.9100e-003	0.0000	25.3542	25.3542	1.1900e-003	0.0000	25.3839
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.4000e-004	4.1000e-004	4.1900e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.2000e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	1.0531	1.0531	3.0000e-005	0.0000	1.0538
Total	**3.5300e-003**	**0.1028**	**0.0244**	**2.7000e-004**	**6.7700e-003**	**4.0000e-004**	**7.1700e-003**	**1.8500e-003**	**3.9000e-004**	**2.2300e-003**	**0.0000**	**26.4073**	**26.4073**	**1.2200e-003**	**0.0000**	**26.4378**

3.3 Site Preparation - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0452	0.0000	0.0452	0.0248	0.0000	0.0248	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0108	0.1139	0.0552	9.0000e-005		5.9800e-003	5.9800e-003		5.5000e-003	5.5000e-003	0.0000	8.5422	8.5422	2.7000e-003	0.0000	8.6097
Total	**0.0108**	**0.1139**	**0.0552**	**9.0000e-005**	**0.0452**	**5.9800e-003**	**0.0512**	**0.0248**	**5.5000e-003**	**0.0303**	**0.0000**	**8.5422**	**8.5422**	**2.7000e-003**	**0.0000**	**8.6097**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.6000e-004	1.2000e-004	1.2600e-003	0.0000	3.6000e-004	0.0000	3.6000e-004	9.0000e-005	0.0000	1.0000e-004	0.0000	0.3159	0.3159	1.0000e-005	0.0000	0.3162
Total	**1.6000e-004**	**1.2000e-004**	**1.2600e-003**	**0.0000**	**3.6000e-004**	**0.0000**	**3.6000e-004**	**9.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**	**0.3159**	**0.3159**	**1.0000e-005**	**0.0000**	**0.3162**

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Fugitive Dust					0.0452	0.0000	0.0452	0.0248	0.0000	0.0248	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0108	0.1139	0.0552	9.0000e-005		5.9800e-003	5.9800e-003		5.5000e-003	5.5000e-003	0.0000	8.5422	8.5422	2.7000e-003	0.0000	8.6097
Total	**0.0108**	**0.1139**	**0.0552**	**9.0000e-005**	**0.0452**	**5.9800e-003**	**0.0512**	**0.0248**	**5.5000e-003**	**0.0303**	**0.0000**	**8.5422**	**8.5422**	**2.7000e-003**	**0.0000**	**8.6097**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.6000e-004	1.2000e-004	1.2600e-003	0.0000	3.6000e-004	0.0000	3.6000e-004	9.0000e-005	0.0000	1.0000e-004	0.0000	0.3159	0.3159	1.0000e-005	0.0000	0.3162
Total	**1.6000e-004**	**1.2000e-004**	**1.2600e-003**	**0.0000**	**3.6000e-004**	**0.0000**	**3.6000e-004**	**9.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**	**0.3159**	**0.3159**	**1.0000e-005**	**0.0000**	**0.3162**

3.4 Grading - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0270	0.0000	0.0270	0.0136	0.0000	0.0136	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0103	0.1134	0.0652	1.2000e-004		5.5900e-003	5.5900e-003		5.1400e-003	5.1400e-003	0.0000	10.6569	10.6569	3.3700e-003	0.0000	10.7412
Total	**0.0103**	**0.1134**	**0.0652**	**1.2000e-004**	**0.0270**	**5.5900e-003**	**0.0326**	**0.0136**	**5.1400e-003**	**0.0187**	**0.0000**	**10.6569**	**10.6569**	**3.3700e-003**	**0.0000**	**10.7412**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	7.6400e-003	0.2618	0.0517	6.7000e-004	0.0143	1.0000e-003	0.0153	3.9200e-003	9.6000e-004	4.8800e-003	0.0000	64.8112	64.8112	3.0400e-003	0.0000	64.8872
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.2000e-004	1.6000e-004	1.6800e-003	0.0000	4.8000e-004	0.0000	4.8000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.4213	0.4213	1.0000e-005	0.0000	0.4215
Total	**7.8600e-003**	**0.2620**	**0.0534**	**6.7000e-004**	**0.0147**	**1.0000e-003**	**0.0157**	**4.0500e-003**	**9.6000e-004**	**5.0100e-003**	**0.0000**	**65.2325**	**65.2325**	**3.0500e-003**	**0.0000**	**65.3087**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0270	0.0000	0.0270	0.0136	0.0000	0.0136	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0103	0.1134	0.0652	1.2000e-004		5.5900e-003	5.5900e-003		5.1400e-003	5.1400e-003	0.0000	10.6569	10.6569	3.3700e-003	0.0000	10.7412
Total	**0.0103**	**0.1134**	**0.0652**	**1.2000e-004**	**0.0270**	**5.5900e-003**	**0.0326**	**0.0136**	**5.1400e-003**	**0.0187**	**0.0000**	**10.6569**	**10.6569**	**3.3700e-003**	**0.0000**	**10.7412**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	7.6400e-003	0.2618	0.0517	6.7000e-004	0.0143	1.0000e-003	0.0153	3.9200e-003	9.6000e-004	4.8800e-003	0.0000	64.8112	64.8112	3.0400e-003	0.0000	64.8872
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.2000e-004	1.6000e-004	1.6800e-003	0.0000	4.8000e-004	0.0000	4.8000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.4213	0.4213	1.0000e-005	0.0000	0.4215
Total	**7.8600e-003**	**0.2620**	**0.0534**	**6.7000e-004**	**0.0147**	**1.0000e-003**	**0.0157**	**4.0500e-003**	**9.6000e-004**	**5.0100e-003**	**0.0000**	**65.2325**	**65.2325**	**3.0500e-003**	**0.0000**	**65.3087**

3.5 Building Construction - 2019

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Off-Road	0.2184	1.9498	1.5877	2.4900e-003		0.1193	0.1193		0.1122	0.1122	0.0000	217.4714	217.4714	0.0530	0.0000	218.7958
Total	**0.2184**	**1.9498**	**1.5877**	**2.4900e-003**		**0.1193**	**0.1193**		**0.1122**	**0.1122**	**0.0000**	**217.4714**	**217.4714**	**0.0530**	**0.0000**	**218.7958**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0136	0.3504	0.0941	7.6000e-004	0.0183	2.5200e-003	0.0208	5.2800e-003	2.4100e-003	7.6900e-003	0.0000	72.9969	72.9969	3.6200e-003	0.0000	73.0874
Worker	0.0255	0.0190	0.1964	5.5000e-004	0.0558	3.7000e-004	0.0561	0.0148	3.4000e-004	0.0152	0.0000	49.3565	49.3565	1.3400e-003	0.0000	49.3901
Total	**0.0391**	**0.3694**	**0.2905**	**1.3100e-003**	**0.0740**	**2.8900e-003**	**0.0769**	**0.0201**	**2.7500e-003**	**0.0229**	**0.0000**	**122.3533**	**122.3533**	**4.9600e-003**	**0.0000**	**122.4775**

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Off-Road	0.2184	1.9498	1.5877	2.4900e-003		0.1193	0.1193		0.1122	0.1122	0.0000	217.4711	217.4711	0.0530	0.0000	218.7956
Total	**0.2184**	**1.9498**	**1.5877**	**2.4900e-003**		**0.1193**	**0.1193**		**0.1122**	**0.1122**	**0.0000**	**217.4711**	**217.4711**	**0.0530**	**0.0000**	**218.7956**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0136	0.3504	0.0941	7.6000e-004	0.0183	2.5200e-003	0.0208	5.2800e-003	2.4100e-003	7.6900e-003	0.0000	72.9969	72.9969	3.6200e-003	0.0000	73.0874
Worker	0.0255	0.0190	0.1964	5.5000e-004	0.0558	3.7000e-004	0.0561	0.0148	3.4000e-004	0.0152	0.0000	49.3565	49.3565	1.3400e-003	0.0000	49.3901
Total	**0.0391**	**0.3694**	**0.2905**	**1.3100e-003**	**0.0740**	**2.8900e-003**	**0.0769**	**0.0201**	**2.7500e-003**	**0.0229**	**0.0000**	**122.3533**	**122.3533**	**4.9600e-003**	**0.0000**	**122.4775**

3.5 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0477	0.4317	0.3791	6.1000e-004		0.0251	0.0251		0.0236	0.0236	0.0000	52.1123	52.1123	0.0127	0.0000	52.4301
Total	**0.0477**	**0.4317**	**0.3791**	**6.1000e-004**		**0.0251**	**0.0251**		**0.0236**	**0.0236**	**0.0000**	**52.1123**	**52.1123**	**0.0127**	**0.0000**	**52.4301**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.6800e-003	0.0769	0.0205	1.8000e-004	4.4400e-003	3.8000e-004	4.8200e-003	1.2800e-003	3.6000e-004	1.6500e-003	0.0000	17.6474	17.6474	8.1000e-004	0.0000	17.6676
Worker	5.6800e-003	4.0800e-003	0.0428	1.3000e-004	0.0136	9.0000e-005	0.0137	3.6100e-003	8.0000e-005	3.6900e-003	0.0000	11.6306	11.6306	2.9000e-004	0.0000	11.6377
Total	**8.3600e-003**	**0.0809**	**0.0633**	**3.1000e-004**	**0.0180**	**4.7000e-004**	**0.0185**	**4.8900e-003**	**4.4000e-004**	**5.3400e-003**	**0.0000**	**29.2780**	**29.2780**	**1.1000e-003**	**0.0000**	**29.3053**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0477	0.4317	0.3791	6.1000e-004		0.0251	0.0251		0.0236	0.0236	0.0000	52.1122	52.1122	0.0127	0.0000	52.4300
Total	**0.0477**	**0.4317**	**0.3791**	**6.1000e-004**		**0.0251**	**0.0251**		**0.0236**	**0.0236**	**0.0000**	**52.1122**	**52.1122**	**0.0127**	**0.0000**	**52.4300**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.6800e-003	0.0769	0.0205	1.8000e-004	4.4400e-003	3.8000e-004	4.8200e-003	1.2800e-003	3.6000e-004	1.6500e-003	0.0000	17.6474	17.6474	8.1000e-004	0.0000	17.6676
Worker	5.6800e-003	4.0800e-003	0.0428	1.3000e-004	0.0136	9.0000e-005	0.0137	3.6100e-003	8.0000e-005	3.6900e-003	0.0000	11.6306	11.6306	2.9000e-004	0.0000	11.6377
Total	**8.3600e-003**	**0.0809**	**0.0633**	**3.1000e-004**	**0.0180**	**4.7000e-004**	**0.0185**	**4.8900e-003**	**4.4000e-004**	**5.3400e-003**	**0.0000**	**29.2780**	**29.2780**	**1.1000e-003**	**0.0000**	**29.3053**

3.6 Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0107	0.1062	0.1105	1.7000e-004		5.8600e-003	5.8600e-003		5.4000e-003	5.4000e-003	0.0000	14.7348	14.7348	4.6300e-003	0.0000	14.8506
Paving	6.9000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0113**	**0.1062**	**0.1105**	**1.7000e-004**		**5.8600e-003**	**5.8600e-003**		**5.4000e-003**	**5.4000e-003**	**0.0000**	**14.7348**	**14.7348**	**4.6300e-003**	**0.0000**	**14.8506**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.0000e-004	4.3000e-004	4.5000e-003	1.0000e-005	1.4300e-003	1.0000e-005	1.4400e-003	3.8000e-004	1.0000e-005	3.9000e-004	0.0000	1.2243	1.2243	3.0000e-005	0.0000	1.2250
Total	**6.0000e-004**	**4.3000e-004**	**4.5000e-003**	**1.0000e-005**	**1.4300e-003**	**1.0000e-005**	**1.4400e-003**	**3.8000e-004**	**1.0000e-005**	**3.9000e-004**	**0.0000**	**1.2243**	**1.2243**	**3.0000e-005**	**0.0000**	**1.2250**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0107	0.1062	0.1105	1.7000e-004		5.8600e-003	5.8600e-003		5.4000e-003	5.4000e-003	0.0000	14.7348	14.7348	4.6300e-003	0.0000	14.8506
Paving	6.9000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0113**	**0.1062**	**0.1105**	**1.7000e-004**		**5.8600e-003**	**5.8600e-003**		**5.4000e-003**	**5.4000e-003**	**0.0000**	**14.7348**	**14.7348**	**4.6300e-003**	**0.0000**	**14.8506**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.0000e-004	4.3000e-004	4.5000e-003	1.0000e-005	1.4300e-003	1.0000e-005	1.4400e-003	3.8000e-004	1.0000e-005	3.9000e-004	0.0000	1.2243	1.2243	3.0000e-005	0.0000	1.2250
Total	**6.0000e-004**	**4.3000e-004**	**4.5000e-003**	**1.0000e-005**	**1.4300e-003**	**1.0000e-005**	**1.4400e-003**	**3.8000e-004**	**1.0000e-005**	**3.9000e-004**	**0.0000**	**1.2243**	**1.2243**	**3.0000e-005**	**0.0000**	**1.2250**

3.7 Architectural Coating - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.8260					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.1800e-003	0.0152	0.0165	3.0000e-005		1.0000e-003	1.0000e-003		1.0000e-003	1.0000e-003	0.0000	2.2979	2.2979	1.8000e-004	0.0000	2.3024
Total	**0.8282**	**0.0152**	**0.0165**	**3.0000e-005**		**1.0000e-003**	**1.0000e-003**		**1.0000e-003**	**1.0000e-003**	**0.0000**	**2.2979**	**2.2979**	**1.8000e-004**	**0.0000**	**2.3024**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.5000e-004	3.2000e-004	3.3800e-003	1.0000e-005	1.0700e-003	1.0000e-005	1.0800e-003	2.8000e-004	1.0000e-005	2.9000e-004	0.0000	0.9182	0.9182	2.0000e-005	0.0000	0.9188
Total	**4.5000e-004**	**3.2000e-004**	**3.3800e-003**	**1.0000e-005**	**1.0700e-003**	**1.0000e-005**	**1.0800e-003**	**2.8000e-004**	**1.0000e-005**	**2.9000e-004**	**0.0000**	**0.9182**	**0.9182**	**2.0000e-005**	**0.0000**	**0.9188**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.8260					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.1800e-003	0.0152	0.0165	3.0000e-005		1.0000e-003	1.0000e-003		1.0000e-003	1.0000e-003	0.0000	2.2979	2.2979	1.8000e-004	0.0000	2.3024
Total	**0.8282**	**0.0152**	**0.0165**	**3.0000e-005**		**1.0000e-003**	**1.0000e-003**		**1.0000e-003**	**1.0000e-003**	**0.0000**	**2.2979**	**2.2979**	**1.8000e-004**	**0.0000**	**2.3024**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.5000e-004	3.2000e-004	3.3800e-003	1.0000e-005	1.0700e-003	1.0000e-005	1.0800e-003	2.8000e-004	1.0000e-005	2.9000e-004	0.0000	0.9182	0.9182	2.0000e-005	0.0000	0.9188
Total	**4.5000e-004**	**3.2000e-004**	**3.3800e-003**	**1.0000e-005**	**1.0700e-003**	**1.0000e-005**	**1.0800e-003**	**2.8000e-004**	**1.0000e-005**	**2.9000e-004**	**0.0000**	**0.9182**	**0.9182**	**2.0000e-005**	**0.0000**	**0.9188**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Mitigated	0.0462	0.2034	0.5909	1.9200e-003	0.1693	1.9100e-003	0.1712	0.0453	1.7900e-003	0.0471	0.0000	175.6719	175.6719	6.1000e-003	0.0000	175.8243
Unmitigated	0.0462	0.2034	0.5909	1.9200e-003	0.1693	1.9100e-003	0.1712	0.0453	1.7900e-003	0.0471	0.0000	175.6719	175.6719	6.1000e-003	0.0000	175.8243

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Heavy Industry	155.90	155.90	155.90	455,138	455,138
Parking Lot	0.00	0.00	0.00		

Total	155.90	155.90	155.90	455,138	455,138

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Heavy	9.50	7.30	7.30	59.00	28.00	13.00	92	5	3
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Heavy Industry	0.604810	0.038204	0.185149	0.108513	0.015498	0.004981	0.012268	0.020156	0.002083	0.001571	0.005363	0.000620	0.000785
Parking Lot	0.604810	0.038204	0.185149	0.108513	0.015498	0.004981	0.012268	0.020156	0.002083	0.001571	0.005363	0.000620	0.000785

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	30,420.8872	30,420.8872	2.5351	0.5245	30,640.5644
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	30,420.8872	30,420.8872	2.5351	0.5245	30,640.5644
NaturalGas Mitigated	0.0224	0.2036	0.1711	1.2200e-003		0.0155	0.0155		0.0155	0.0155	0.0000	221.6764	221.6764	4.2500e-003	4.0600e-003	222.9937
NaturalGas Unmitigated	0.0224	0.2036	0.1711	1.2200e-003		0.0155	0.0155		0.0155	0.0155	0.0000	221.6764	221.6764	4.2500e-003	4.0600e-003	222.9937

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Heavy Industry	4.15406e+006	0.0224	0.2036	0.1711	1.2200e-003		0.0155	0.0155		0.0155	0.0155	0.0000	221.6764	221.6764	4.2500e-003	4.0600e-003	222.9937
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0224**	**0.2036**	**0.1711**	**1.2200e-003**		**0.0155**	**0.0155**		**0.0155**	**0.0155**	**0.0000**	**221.6764**	**221.6764**	**4.2500e-003**	**4.0600e-003**	**222.9937**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Heavy Industry	4.15406e+006	0.0224	0.2036	0.1711	1.2200e-003		0.0155	0.0155		0.0155	0.0155	0.0000	221.6764	221.6764	4.2500e-003	4.0600e-003	222.9937
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0224**	**0.2036**	**0.1711**	**1.2200e-003**		**0.0155**	**0.0155**		**0.0155**	**0.0155**	**0.0000**	**221.6764**	**221.6764**	**4.2500e-003**	**4.0600e-003**	**222.9937**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use		Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	tons/yr	MT/yr			
General Heavy Industry	1.92712e+008		30,419.5833	2.5350	0.5245	30,639.2512
Parking Lot	8260		1.3038	1.1000e-004	2.0000e-005	1.3133
Total			**30,420.8872**	**2.5351**	**0.5245**	**30,640.5644**

Mitigated

	Electricity Use		Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	tons/yr	MT/yr			
General Heavy Industry	1.92712e+008		30,419.5833	2.5350	0.5245	30,639.2512
Parking Lot	8260		1.3038	1.1000e-004	2.0000e-005	1.3133
Total			**30,420.8872**	**2.5351**	**0.5245**	**30,640.5644**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.6993	2.0000e-005	2.0000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.8700e-003	3.8700e-003	1.0000e-005	0.0000	4.1300e-003
Unmitigated	0.6993	2.0000e-005	2.0000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.8700e-003	3.8700e-003	1.0000e-005	0.0000	4.1300e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0826					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.6165					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.9000e-004	2.0000e-005	2.0000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.8700e-003	3.8700e-003	1.0000e-005	0.0000	4.1300e-003
Total	**0.6993**	**2.0000e-005**	**2.0000e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**3.8700e-003**	**3.8700e-003**	**1.0000e-005**	**0.0000**	**4.1300e-003**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0826					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.6165					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.9000e-004	2.0000e-005	2.0000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.8700e-003	3.8700e-003	1.0000e-005	0.0000	4.1300e-003
Total	**0.6993**	**2.0000e-005**	**2.0000e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**3.8700e-003**	**3.8700e-003**	**1.0000e-005**	**0.0000**	**4.1300e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

		Total CO2	CH4	N2O	CO2e
Category	tons/yr	MT/yr			
Mitigated		0.2099	2.2000e-004	1.4000e-004	0.2561
Unmitigated		0.2099	2.2000e-004	1.4000e-004	0.2561

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use		Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr	MT/yr			
General Heavy Industry	0.173752 / 0		0.2099	2.2000e-004	1.4000e-004	0.2561
Parking Lot	0 / 0		0.0000	0.0000	0.0000	0.0000
Total			**0.2099**	**2.2000e-004**	**1.4000e-004**	**0.2561**

Mitigated

	Indoor/Outdoor Use		Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr	MT/yr			
General Heavy Industry	0.173752 / 0		0.2099	2.2000e-004	1.4000e-004	0.2561
Parking Lot	0 / 0		0.0000	0.0000	0.0000	0.0000
Total			**0.2099**	**2.2000e-004**	**1.4000e-004**	**0.2561**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

		Total CO2	CH4	N2O	CO2e
	tons/yr	MT/yr			
Mitigated		39.6360	2.3424	0.0000	98.1966
Unmitigated		39.6360	2.3424	0.0000	98.1966

8.2 Waste by Land Use

Unmitigated

	Waste Disposed		Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr	MT/yr			
General Heavy Industry	195.26		39.6360	2.3424	0.0000	98.1966
Parking Lot	0		0.0000	0.0000	0.0000	0.0000
Total			**39.6360**	**2.3424**	**0.0000**	**98.1966**

Mitigated

	Waste Disposed		Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr	MT/yr			
General Heavy Industry	195.26		39.6360	2.3424	0.0000	98.1966
Parking Lot	0		0.0000	0.0000	0.0000	0.0000

Total			39.6360	2.3424	0.0000	98.1966

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

From: Kathleen Hughes <khughes@SantaClaraCA.gov>
Date: February 6, 2019 at 2:46:10 PM PST
To: Alexander Abbe <aabbe@SantaClaraCA.gov>
Subject: RE: NEW Carbon intensity number

Xander,
Sorry to take so long. I still do not have the 2018 number finalized (it will take a couple of weeks until all the data is verified). Use the 2019 number for now. These are the forecasted numbers through 2030 but do not account for market sales which will make the number lower in some years. These are all in LBs.

2019	2020	2021	2022
341	348	271	230

2025	2026	2027	2028	2029	2030
277	279	276	273	270	219

From: Kathleen Hughes
To: Diana Fazely; Alexander Abbe
Cc: Ann Hatcher; John Roukema
Subject: RE: NEW Carbon intensity number
Date: Thursday, December 13, 2018 8:38:29 AM

Our 2017 carbon number for delivered energy to our retail customers was .192 MTCO2e/MWh or 423 lbsCO2e/MWh. This is with coal still in our portfolio and a very good hydro year.
We will have the 2018 numbers soon as the year closes out. We should be in within range of the 2020 goal.
Let me know if you have any questions,
Kathleen

Attachment 3: Stationary Equipment Emissions Calculations
- Data Center Emergency Generators Emission Calculations and Engine Data

Specification sheet

Diesel generator set QST30 series engine

680 kW - 1000 kW 60 Hz

Description

Cummins® commercial generator sets are fully integrated power generation systems providing optimum performance, reliability and versatility for stationary Standby and Prime power applications.

Features

Cummins heavy-duty engine - Rugged 4-cycle, industrial diesel delivers reliable power, low emissions and fast response to load changes.

Alternator - Several alternator sizes offer selectable motor starting capability with low reactance 2/3 pitch windings, low waveform distortion with non-linear loads and fault clearing short-circuit capability.

Permanent Magnet Generator (PMG) - Offers enhanced motor starting and fault clearing short circuit capability.

Circuit breakers - Option for manually-and/or electrically-operated circuit breakers.

Control system - The PowerCommand® electronic control is standard equipment and provides total generator set system integration including automatic remote starting/stopping, precise frequency and voltage regulation, alarm and status message display, AmpSentry™ protection, output metering, auto-shutdown at fault detection and NFPA 110 Level 1 compliance.

Masterless Paralleling - An optional electrically operated circuit breaker can be added for a simple masterless paralleling solution.

Cooling system - Standard integral set-mounted radiator system, designed and tested for rated ambient temperatures, simplifies facility design requirements for rejected heat.

NFPA - The generator set accepts full rated load in a single step in accordance with NFPA 110 for Level 1 systems.

Warranty and service - Backed by a comprehensive warranty and worldwide distributor network.

	Standby rating	Prime rating	Continuous rating	Data sheets
Model	60 Hz kW (kVA)	60 Hz kW (kVA)	60 Hz kW (kVA)	60 Hz
DQFAA	750 (938)	680 (850)		D-3329
DQFAB	800 (1000)	725 (907)		D-3330
DQFAC	900 (1125)	818 (1023)		D-3331
DQFAD	1000 (1250)	900 (1125)		D-3332

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Generator set specifications

Governor regulation class	ISO 8528 Part 1 Class G3
Voltage regulation, no load to full load	± 0.5%
Random voltage variation	± 0.5%
Frequency regulation	Isochronous
Random frequency variation	± 0.25%
Radio frequency emissions compliance	IEC 61000-4-2: Level 4 Electrostatic discharge IEC 61000-4-3: Level 3 Radiated susceptibility

Engine specifications

Bore	140 mm (5.51 in.)
Stroke	165.0 mm (6.5 in.)
Displacement	30.5 L (1860 in^3)
Cylinder block	Cast iron, V 12 cylinder
Battery capacity	1800 amps minimum at ambient temperature of -18 °C to 0 °C (0 °F to 32 °F)
Battery charging alternator	35 amps
Starting voltage	24 volt, negative ground
Fuel system	Direct injection: number 2 diesel fuel, fuel filter, automatic electric fuel shutoff
Fuel filter	Triple element, 10 micron filtration, spin-on fuel filters with water separator
Air cleaner type	Dry replaceable element
Lube oil filter type(s)	Four spin-on, combination full flow filter and bypass filters
Standard cooling system	High ambient radiator

Alternator specifications

Design	Brushless, 4 pole, drip-proof, revolving field
Stator	2/3 pitch
Rotor	Single bearing flexible discs
Insulation system	Class H on low and medium voltage, Class F on high voltage
Standard temperature rise	150 °C Standby at 40 °C ambient
Exciter type	PMG (Permanent Magnet Generator)
Phase rotation	A (U), B (V), C (W)
Alternator cooling	Direct drive centrifugal blower fan
AC waveform Total Harmonic Distortion (THDV)	< 5% no load to full linear load, < 3% for any single harmonic
Telephone Influence Factor (TIF)	< 50 per NEMA MG1-22.43
Telephone Harmonic Factor (THF)	< 3

Available voltages

60 Hz Line – Neutral/Line - Line

• 120/208	• 220/380	• 240/416	• 347/600
• 139/240	• 230/400	• 277/480	

Note: Consult factory for other voltages.

Generator set options

Engine

- 208/240/480 V coolant heater for ambient above 4.5 °C (40 °F)
- 208/240/480 V coolant heater for ambient below 4.5 °C (40 °F)

Control panel

- PowerCommand 3.3 with Masterless Load Demand (MLD)
- Run relay package
- Ground fault indication
- Paralleling configuration
- Remote fault signal package
- Exhaust gas temperature sensor
- 120/240 V 100 W control anti-condensation heater

Alternator

- 80 °C rise
- 105 °C rise
- 150 °C rise
- 120/240 V 300 W anti-condensation heater
- Temperature sensor - RTDs, 2-phase
- Temperature sensor – alternator bearing RTD
- Differential current transformers

Exhaust system

- Critical grade exhaust silencer
- Exhaust packages
- Industrial grade exhaust silencer
- Residential grade exhaust silencer

Cooling system

- High ambient 50 °C radiator

Generator set

- AC entrance box
- Battery
- Battery rack with hold-down - floor standing
- Circuit breaker - set mounted
- Disconnect switch - set mounted
- PowerCommand network
- Remote annunciator panel
- Spring isolators
- 2 year warranty
- 5 year warranty
- 10 year major components warranty

Note: Some options may not be available on all models - consult factory for availability.

PowerCommand 3.3 Control System

An integrated microprocessor based generator set control system providing voltage regulation, engine protection, alternator protection, operator interface and isochronous governing. Refer to document S-1570 for more detailed information on the control.

AmpSentry – Includes integral AmpSentry protection, which provides a full range of alternator protection functions that are matched to the alternator provided.

Power management – Control function provides battery monitoring and testing features and smart starting control system.

Advanced control methodology – Three phase sensing, full wave rectified voltage regulation, with a PWM output for stable operation with all load types.

Communications interface – Control comes standard with PCCNet and Modbus® interface.

Regulation compliant – Prototype tested: UL, CSA and CE compliant.

Service - InPower™ PC-based service tool available for detailed diagnostics, setup, data logging and fault simulation.

Easily upgradeable – PowerCommand controls are designed with common control interfaces.

Reliable design – The control system is designed for reliable operation in harsh environment.

Multi-language support

Operator panel features

Operator/display functions

- Displays paralleling breaker status
- Provides direct control of the paralleling breaker
- 320 x 240 pixels graphic LED backlight LCD
- Auto, manual, start, stop, fault reset and lamp test/panel lamp switches
- Alpha-numeric display with pushbuttons
- LED lamps indicating generator set running, remote start, not in auto, common shutdown, common warning, manual run mode, auto mode and stop

Paralleling control functions

- First Start Sensor System selects first generator set to close to bus
- Phase Lock Loop Synchronizer with voltage matching
- Sync check relay
- Isochronous kW and kVar load sharing
- Load govern control for utility paralleling
- Extended Paralleling (Base Load/Peak Shave) Mode
- Digital power transfer control, for use with a breaker pair to provide open transition, closed transition, ramping closed transition, peaking and base load functions,
- Alternator data
- Line-to-Neutral and Line-to-Line AC volts
- 3-phase AC current
- Frequency
- kW, kVar, power factor kVA (three phase and total)
- Engine data
- DC voltage
- Engine speed
- Lube oil pressure and temperature
- Coolant temperature
- Comprehensive FAE data (where applicable)
- Other data
- Genset model data
- Start attempts, starts, running hours, kW hours
- Load profile (operating hours at % load in 5% increments)
- Fault history
- Data logging and fault simulation (requires InPower)

Standard control functions

Digital governing

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital voltage regulation

- Integrated digital electronic voltage regulator
- 3-phase, 4-wire Line-to-Line sensing
- Configurable torque matching

AmpSentry AC protection

- AmpSentry protective relay
- Over current and short circuit shutdown
- Over current warning
- Single and three phase fault regulation
- Over and under voltage shutdown
- Over and under frequency shutdown
- Overload warning with alarm contact
- Reverse power and reverse Var shutdown
- Field overload shutdown

Engine protection

- Battery voltage monitoring, protection and testing
- Overspeed shutdown
- Low oil pressure warning and shutdown
- High coolant temperature warning and shutdown
- Low coolant level warning or shutdown
- Low coolant temperature warning
- Fail to start (overcrank) shutdown
- Fail to crank shutdown
- Cranking lockout
- Sensor failure indication
- Low fuel level warning or shutdown
- Fuel-in-rupture-basin warning or shutdown
- Full authority electronic engine protection

Control functions

- Time delay start and cool down
- Real time clock for fault and event time stamping
- Exerciser clock and time of day start/stop
- Data logging
- Cycle cranking
- Load shed
- Configurable inputs and outputs (4)
- Remote emergency stop

Options

- Auxiliary output relays (2)

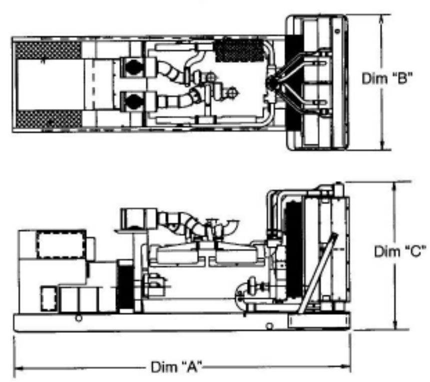
Ratings definitions

Emergency Standby Power (ESP):
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Limited-Time Running Power (LTP):
Applicable for supplying power to a constant electrical load for limited hours. Limited-Time running Power (LTP) is in accordance with ISO 8528.

Prime Power (PRP):
Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Base Load (Continuous) Power (COP):
Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.



- This outline drawing is for reference only. See respective model data sheet for specific model outline drawing number.

Model	Dim 'A' (mm)	Dim 'B' (mm)	Dim 'C' (mm)	Set Weight dry* (kg)	Set Weight wet* (kg)
DQFAA	4287 (168.8)	1990 (78.3)	2355 (92.7)	6633 (14625)	6896 (15205)
DQFAB	4287 (168.8)	1990 (78.3)	2355 (92.7)	6857 (15117)	7120 (15697)
DQFAC	4287 (168.8)	1990 (78.3)	2355 (92.7)	7335 (16172)	7598 (16752)
DQFAD	4287 (168.8)	1990 (78.3)	2355 (92.7)	7594 (16742)	7857 (17322)

* Weights represent a set with standard features. See outline drawings for weights of other configurations.

Exhaust emission data sheet
1000DQFAD
60 Hz Diesel generator set

Engine information:

Model:	Cummins Inc. QST30-G5 NR2	Bore:	5.51 in. (139 mm)
Type:	4 Cycle, 50° V, 12 cylinder diesel	Stroke:	6.5 in. (165 mm)
Aspiration:	Turbocharged and low temperature after-cooled	Displacement:	1860 cu. in. (30.4 liters)
Compression ratio:	14.7:1		
Emission control device:	After-cooled (air-to-air)		

Performance data	1/4 Standby	1/2 Standby	3/4 Standby	Full Standby	Full Prime
BHP @ 1800 RPM (60 Hz)	371	741	1112	1482	1322
Fuel consumption (gal/Hr)	19.1	35.8	54.1	72.2	63.9
Exhaust gas flow (CFM)	2780	4500	6370	7540	6950
Exhaust gas temperature (°F)	620	760	814	890	873
Exhaust emission data					
HC (Total unburned hydrocarbons)	0.12	0.10	0.08	0.07	0.08
NOx (Oxides of nitrogen as NO2)	4.17	5.20	3.87	3.95	4.00
CO (Carbon monoxide)	0.66	0.36	0.48	0.66	0.58
PM (Particular matter)	0.19	0.15	0.12	0.11	0.11
SO2 (Sulfur dioxide)	0.11	0.10	0.10	0.11	0.10
Smoke (Bosch)	0.88	0.80	0.79	0.73	0.75

All values are Grams/HP-Hour, Smoke is Bosch #

Test conditions

Data was recorded during steady-state rated engine speed (± 25 RPM) with full load (± 2%). Pressures, temperatures, and emission rates were stabilized.

Fuel specification:	46.5 Cetane Number, 0.035 Wt.% Sulfur; Reference ISO8178-5, 40CFR86. 1313-98 Type 2-D and ASTM D975 No. 2-D.
Fuel temperature:	99 ± 9 °F (at fuel pump inlet)
Intake air temperature:	77 ± 9 °F
Barometric pressure:	29.6 ± 1 in. Hg
Humidity:	NOx measurement corrected to 75 grains H2O/lb dry air
Reference standard:	ISO 8178

The NOx, HC, CO and PM emission data tabulated here were taken from a single engine under the test conditions shown above. Data for the other components are estimated. These data are subjected to instrumentation and engine-to-engine variability. Field emission test data are not guaranteed to these levels. Actual field test results may vary due to test site conditions, installation, fuel specification, test procedures and instrumentation. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may results in elevated emission levels.

Specification sheet

Diesel Generator set QSK95 series engine

2500 kW-3500 kW 60 Hz

EPA Tier 2 emissions regulated

Description

Cummins® commercial generator sets are fully integrated power generation systems providing optimum performance, fuel economy, reliability and versatility for stationary Standby, Prime and Continuous power applications.

Features

Cummins heavy-duty engine - Rugged 4-cycle, industrial diesel delivers reliable power, low emissions and fast response to load changes.

Alternator - Several alternator sizes offer selectable motor starting capability with low reactance windings, low waveform distortion with non-linear loads and fault clearing short-circuit capability.

Control system - The PowerCommand® digital control is standard equipment and provides total genset system integration including automatic remote starting/stopping, precise frequency and voltage regulation, alarm and status message display, AmpSentry™ protective relay, output metering and auto-shutdown.

Cooling system - Standard and enhanced integral set-mounted radiator systems, designed and tested for rated ambient temperatures, simplifies facility design requirements for rejected heat. Also optional remote cooled configuration for non-factory supplied cooling systems.

Warranty and service - Backed by a comprehensive warranty and worldwide distributor network.

NFPA - The generator set accepts full rated load in a single step in accordance with NFPA 110 for Level 1 systems.

	Standby rating	Prime rating	Continuous rating	Emissions compliance	Data sheets
Model	60 Hz kW (kVA)	60 Hz kW (kVA)	60 Hz kW (kVA)	EPA	60 Hz
C3000 D6e	3000 (3750)	2750 (3438)	2500 (3125)	EPA Tier 2	NAD-5942-EN
C3250 D6e	3250 (4063)	3000 (3750)	2500 (3125)	EPA Tier 2	NAD-3527-EN
C3500 D6e	3500 (4375)	3000 (3750)	2750 (3438)	EPA Tier 2	NAD-5917-EN

Note: All ratings include radiator fan losses.

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Generator set specifications

Governor regulation class	ISO 8528 Part 1 Class G3
Voltage regulation, no load to full load	± 0.5%
Random voltage variation	± 0.5%
Frequency regulation	Isochronous
Random frequency variation	± 0.25%
Radio Frequency (RF) emission compliance	47 CFR FCC PART 15 Subpart B (Class A for industrial)

Engine specifications

Bore	190 mm (7.48 in)
Stroke	210 mm (8.27 in)
Displacement	95.3 litres (5815 in^3)
Configuration	Cast iron, V 16 cylinder
Battery capacity	6 x 1400 amps minimum at ambient temperature of -18 °C (0 °F)
Battery charging alternator	145 amps
Starting voltage	24 volt, negative ground
Fuel system	Cummins modular common rail system
Fuel filter	On engine triple element, 5 micron primary filtration with water separators, 3 micron/2 micron (filter in filter design) secondary filtration.
Fuel transfer pump	Electronic variable speed priming and lift pump
Breather	Cummins impactor breather system
Air cleaner type	Unhoused dry replaceable element
Lube oil filter type(s)	Spin-on combination full flow filter and bypass filters
Standard cooling system	High ambient cooling system (ship loose)

Alternator specifications

Design	Brushless, 4 pole, drip proof, revolving field
Stator	Optimal
Rotor	Two bearing, flexible coupling
Insulation system	Class H on low and medium voltage, Class F on high voltage
Standard temperature rise	125 °C Standby/105 °C Prime
Exciter type	Optimal
Phase rotation	A (U), B (V), C (W)
Alternator cooling	Direct drive centrifugal blower fan
AC waveform Total Harmonic Distortion (THDV)	< 5% no load to full linear load, < 3% for any single harmonic
Telephone Influence Factor (TIF)	< 50 per NEMA MG1-22.43
Telephone Harmonic Factor (THF)	< 3
Anti-condensation heater	1400 watt

Available voltages

60 Hz Line – Neutral/Line – Line

• 220/380 • 240/416 • 255/440	• 7200/12470 • 277/480 • 347/600	• 2400/4160 • 7620/13200 • 7970/13800

Note: Consult factory for other voltages.

Generator set options and accessories

Engine

- 480 V thermostatically controlled coolant heater for ambient above 4.5 °C (40 °F)
- Heavy duty air cleaner
- Redundant fuel filter
- Air starter
- Redundant electric starting
- Eliminator oil filter system
- Lube oil make up
- Coalescing breather filter

Alternator

- 80 °C rise
- 105 °C rise
- 125 °C rise
- 150 °C rise
- Differential current transformers

Cooling system

- Enhanced high ambient cooling system (ship loose)
- Remote cooled configuration

Generator set options and accessories (continued)

Control panel

- Multiple language support
- Ground fault indication
- Remote annunciator panel
- Paralleling and shutdown alarm relay package
- Floor mounted pedestal installed control panel

Generator set

- Battery
- Battery charger
- LV and MV entrance box
- Spring isolators
- Factory witness tests
- IBC, OSHPD, IEEE seismic certification

Warranty

- 3, 5, or 10 years for Standby including parts (labor and travel optional)
- 2 or 3 years for Prime including parts, labor and travel

Note: Some options may not be available on all models - consult factory for availability.

PowerCommand 3.3 – control system

An integrated microprocessor based generator set control system providing voltage regulation, engine protection, alternator protection, operator interface and isochronous governing. Refer to document S-1570 for more detailed information on the control.

AmpSentry – Includes integral AmpSentry protection, which provides a full range of alternator protection functions that are matched to the alternator provided.

Power management – Control function provides battery monitoring and testing features and smart starting control system.

Advanced control methodology – Three phase sensing, full wave rectified voltage regulation, with a PWM output for stable operation with all load types.

Communications interface – Control comes standard with PCCNet and Modbus interface.

Regulation compliant – Prototype tested: UL, CSA and CE compliant.

Service - InPower™ PC-based service tool available for detailed diagnostics, setup, data logging and fault simulation.

Easily upgradeable – PowerCommand controls are designed with common control interfaces.

Reliable design – The control system is designed for reliable operation in harsh environment.

Multi-language support

Operator panel features

Operator/display functions

- Displays paralleling breaker status
- Provides direct control of the paralleling breaker
- 320 x 240 pixels graphic LED backlight LCD
- Auto, manual, start, stop, fault reset and lamp test/panel lamp switches
- Alpha-numeric display with pushbuttons
- LED lamps indicating genset running, remote start, not in auto, common shutdown, common warning, manual run mode, auto mode and stop

Paralleling control functions

- First Start Sensor™ system selects first genset to close to bus
- Phase lock loop synchronizer with voltage matching
- Sync check relay
- Isochronous kW and kVar load sharing
- Load govern control for utility paralleling
- Extended paralleling (base load/peak shave) mode
- Digital power transfer control, for use with a breaker pair to provide open transition, closed transition, ramping closed transition, peaking and base load functions.

Other control features

- 150 watt anti-condensation heater
- DC distribution panel
- AC auxiliary distribution panel

Alternator data

- Line-to-Neutral and Line-to-Line AC volts
- 3-phase AC current
- Frequency
- kW, kVar, power factor kVA (three phase and total)
- Winding temperature
- Bearing temperature

Engine data

- DC voltage
- Engine speed
- Lube oil pressure and temperature
- Coolant temperature
- Comprehensive FAE data (where applicable)

Other data

- Genset model data
- Start attempts, starts, running hours, kW hours
- Load profile (operating hours at % load in 5% increments)
- Fault history
- Data logging and fault simulation (requires InPower)
- Air cleaner restriction indication
- Exhaust temperature in each cylinder

Standard control functions

Digital governing

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Standard control functions (continued)

Digital voltage regulation

- Integrated digital electronic voltage regulator
- 3-phase, 4-wire Line-to-Line sensing
- Configurable torque matching

AmpSentry AC protection

- AmpSentry protective relay
- Over current and short circuit shutdown
- Over current warning
- Single and three phase fault regulation
- Over and under voltage shutdown
- Over and under frequency shutdown
- Overload warning with alarm contact
- Reverse power and reverse Var shutdown
- Field overload shutdown

Engine protection

- Battery voltage monitoring, protection and testing
- Overspeed shutdown
- Low oil pressure warning and shutdown
- High coolant temperature warning and shutdown
- Low coolant level warning or shutdown
- Low coolant temperature warning
- Fail to start (overcrank) shutdown
- Fail to crank shutdown
- Cranking lockout
- Sensor failure indication
- Low fuel level warning or shutdown
- Fuel-in-rupture-basin warning or shutdown
- Full authority electronic engine protection

Control functions

- Time delay start and cool down
- Real time clock for fault and event time stamping
- Exerciser clock and time of day start/stop
- Data logging
- Cycle cranking
- Load shed
- Configurable inputs and outputs (20)
- Remote emergency stop

Ratings definitions

Emergency Standby Power (ESP):

Applicable for supplying power to varying electrical loads for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Limited-Time Running Power (LTP):

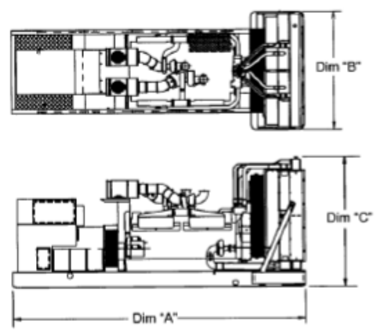
Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.

Prime Power (PRP):

Applicable for supplying power to varying electrical loads for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Base Load (Continuous) Power (COP):

Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.



This outline drawing is for reference only. See PowerSuite library for specific model outline drawing number.

Do not use for installation design

Model	Dim "A"* mm (in.)	Dim "B"* mm (in.)	Dim "C"* mm (in.)	Set weight* dry kg (lbs)	Set weight* wet kg (lbs)
C3000 D6e	7902 (311)	3028 (119)	3663 (144)	29526 (65092)	31194 (68771)
C3250 D6e	7902 (311)	3028 (119)	3663 (144)	29526 (65092)	31194 (68771)
C3500 D6e	7902 (311)	3028 (119)	3663 (144)	29526 (65092)	31194 (68771)

* Weights and dimensions represent a set with standard features and alternator frame P80X. See outline drawing for weights and dimensions of other configurations.

Exhaust emission data sheet
C3250 D6e
60 Hz Diesel generator set
EPA Tier 2

Engine Information:			
Model:	Cummins Inc. QSK95-G9	Bore:	7.48 in. (190 mm)
Type:	4 Cycle, VEE, 16 cylinder diesel	Stroke:	8.27 in. (210 mm)
Aspiration:	Turbocharged and Aftercooled	Displacement:	5816 cu. in. (95.3 liters)
Compression Ratio:	15.5:1		
Emission Control Device:	Turbocharged and Aftercooled		
Emission Level:	Stationary Emergency		

Performance Data	1/4 Standby	1/2 Standby	3/4 Standby	Full Standby	Full Prime	Full Continuous
BHP @ 1800 RPM (60 Hz)	1276	2403	3529	4703	4309	3616
Fuel Consumption L/Hr (US Gal/Hr)	276 (73)	481 (127)	651 (172)	855 (226)	787 (208)	666 (176)
Exhaust Gas Flow m³/min (CFM)	306 (10812)	479 (16928)	584 (20629)	696 (24590)	662 (23372)	592 (20926)
Exhaust Gas Temperature °C (°F)	342 (648)	357 (674)	394 (741)	468 (874)	443 (830)	399 (750)
Exhaust Emission Data						
HC (Total Unburned Hydrocarbons)	0.28 (106)	0.16 (69)	0.09 (43)	0.06 (29)	0.07 (33)	0.09 (42)
NOx (Oxides of Nitrogen as NO_2)	3.3 (1290)	3.3 (1410)	4.5 (2060)	5.7 (2670)	5.2 (2440)	4.6 (2100)
CO (Carbon Monoxide)	0.4 (160)	0.2 (90)	0.2 (70)	0.3 (140)	0.2 (100)	0.2 (70)
PM (Particulate Matter)	0.2 (67)	0.09 (32)	0.05 (21)	0.05 (19)	0.04 (18)	0.05 (21)
SO_2 (Sulfur Dioxide)	0.005 (1.8)	0.005 (1.8)	0.005 (1.8)	0.004 (1.7)	0.005 (1.8)	0.005 (1.8)
Smoke (FSN)	0.92	0.56	0.45	0.49	0.43	0.45

All values (except smoke) are cited: g/BHP-hr (mg/Nm³ @ 5% O_2)

Test Conditions

Steady-state emissions recorded per ISO8178-1 during operation at rated engine speed (+/-2%) and stated constant load (+/-2%) with engine temperatures, pressures and emission rates stabilized.

Fuel Specification:	40-48 Cetane Number, 0.0015 Wt.% Sulfur; Reference ISO8178-5, 40 CFR 86, 1313—98 Type 2-D and ASTM D975 No. 2-D. Fuel Density at 0.85 Kg/L (7.1 lbs/US Gal)
Air Inlet Temperature	25 °C (77 °F)
Fuel Inlet Temperature:	40 °C (104 °F)
Barometric Pressure:	100 kPa (29.53 in Hg)
Humidity:	NOx measurement corrected to 10.7 g/kg (75 grains H_2O/lb) of dry air
Intake Restriction:	Set to 20 in of H_2O as measured from compressor inlet
Exhaust Back Pressure:	Set to 1.5 in Hg
Note:	mg/m³ values are measured dry, corrected to 5% O_2 and normalized to standard temperature and pressure (0°C, 101.325 kPa)

The NOx, HC, CO and PM emission data tabulated here are representative of test data taken from a single engine under the test conditions shown above. Data for the other components are estimated. These data are subjected to instrumentation and engine-to-engine variability. Field emission test data are not guaranteed to these levels. Actual field test results may vary due to test site conditions, installation, fuel specification, test procedures and instrumentation. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may results in elevated emission levels.

Table 1a

1150 Walsh Ave Data Center - Emergency Backup Generators

Ten 3,250 Kilowatt (MW) Generators

Emissions From Periodic Generator Testing - 10 Engines (50 Hours per Year per Engine)

Periodic Engine Testing*

Manufacturer/Model	**Cummins**	**C3250 D6e**
Engine	QSK95-G9	Tier 2 Engine
Engine Output (hp) at Full Load	4,703	
Generator Output (kW) at Full Load	3,250	
Total No. Units	10	
Engine Load During Testing	73%	
Engine Output (hp) at Load	3,435	
Fuel Use (gal/hr) at Load	172	
Fuel Sulfur Content (%)	0.0015	
Emission Testing Information		
	Maximum Daily Testing per Unit	**Maximum** ** **Annual Testing**
No. Units Tested. =	1	10
Test Duration/Unit (min) =	60	60
Tests per Period/Unit =	1	50
Operation./Unit (hours) =	1	50
Total Operation (hours) =	1	500

			Operational			**Operational - Total Emissions[2]**		
	Emission[1]	**Emission**	**Emissions per Unit**			**Average[4]**	**Annual**	
	Factor	**Rate per Unit**	**Daily**	**Annual**	**Annual**	**Daily**	**Maximum**	
Pollutant	**(g/hp-hr)**	**(lb/hr)**	**(lb/day)**	**(lb/yr)**	**(ton/yr)**	**(lb/day)**	**(lb/yr)**	**(ton/yr)**
NOx	4.5	34.08	34.08	1703.85	0.852	46.7	17038.5	8.52
HC	0.09	0.68	0.68	34.08	0.017	0.9	340.8	0.17
CO	0.20	1.51	1.51	75.73	0.038	2.1	757.3	0.38
PM10	0.050	0.38	0.379	18.93	0.0095	0.5	189.3	0.095
PM2.5[3]	0.047	0.35	0.355	17.74	0.0089	0.5	177.4	0.089
SOx[1a]	-	0.04	0.036	1.82	0.0009	0.0	18.2	0.009
CO_2[1b]	22.38 lb/gal	3,849	3,849	192,440	96.2	5,272	1,924,395	962

Notes: * Average load during testing from CalEEMod for emergency generators.

1) Based on Cummins specification sheet for 3250 kW diesel generator set at 75% load (Emission Data Sheet eds-1194c, 1/2018).

1a) Calculated based on fuel sulfur content and EPA AP-42 Table 3.4-1 emission factor.

1b) CO2 emission factor from California Climate Action Registry, General Reporting Protocol, Version 3.1, January 2009

2) Based on the number of units operating for the specified time period

3) Based on CARB CEIDERS PM profile for diesel IC engines, PM2.5 fraction of PM = 0.937

4) Average daily emissions calculated from total annual emissions and 365 days per year

Table 1b
Walsh Data Center - Emergency Backup Generators
One 1,000 Kilowatt (kW) Generator
Emissions From Periodic Generator Testing - One Engine (50 Hours per Year)

Periodic Engine Testing*

Manufacturer/Model	**Cummins**	1000DQFAD
Engine	**QST30-G5-NR2**	Tier 2 Engine
Engine Output (hp) at Full Load	1,482	
Generator Output (kW) at Full Load	1,000	
Total No. Units	1	
Load During Testing	73%	
Max Engine Output at Load (hp)	1,082	
Fuel Use (gal/hr) at Load	54.1	
Fuel Sulfur Content (%)	0.0015	
Emission Testing Information		
	Max. Daily Testing	**Maximum** Annual Testing**
No. Units Tested. =	1	1
Test Duration/Unit (min) =	60	60
Tests per Period/Unit =	1	50
Operation./Unit (hours) =	1	50
Total Operation (hours) =	1	50

Pollutant	**Emission[1] Factor (g/hp-hr)**	**Emission Rate per Unit (lb/hr)**	**Operational Maximum Emissions per Unit Daily (lb/day)**	**Annual (lb/yr)**	**Annual (ton/yr)**	**Operational - Total Emissions[2] Average[4] Daily (lb/day)**	**Annual (lb/yr)**	**Annual (ton/yr)**
NOx	3.87	9.23	9.23	461.7	0.23	1.3	461.7	0.23
HC	0.08	0.19	0.19	9.5	0.00	0.0	9.5	0.00
CO	0.48	1.15	1.15	57.3	0.03	0.2	57.3	0.03
PM10	0.12	0.29	0.29	14.3	0.0072	0.0	14.3	0.007
PM2.5[3]	0.112	0.27	0.27	13.4	0.0067	0.0	13.4	0.007
SOx[1a]	-	0.011	0.011	0.6	0.0003	0.0	0.6	0.0003
CO_2[1b]	22.38 lb/gal	1,211	1,211	60,529	30.3	166	60,529	30

Notes: * Average load during testing from CalEEMod for emergency generators.
1) Based on Cummins specification sheet for 1,000 kW diesel generator set at 75% load (Emission Data Sheet eds-1063, 9/2017).
1a) Calculated based on fuel sulfur content and EPA AP-42 Table 3.4-1 emission factor.
1b) CO2 emission factor from California Climate Action Registry, General Reporting Protocol, Version 3.1, January 2009
2) Based on the number of units operating for the specified time period
3) Based on CARB CEIDERS PM profile for diesel IC engines, PM2.5 fraction of PM = 0.937
4) Average daily emissions calculated from total annual emissions and 365 days per year

Table 1c
1150 Walsh Ave. Data Center - Emergency Backup Generators
Average Daily and Annual Emissions (11 Emergency Generators)

Pollutant	**Operational - Total Emissions (11 Generators) Average* Daily (lb/day)**	**Annual (lb/yr)**	**Annual (ton/yr)**
NOx	47.9	17,500	8.8
ROG	1.0	350	0.2
CO	2.2	815	0.4
PM10	0.6	204	0.1
PM2.5	0.5	191	0.1
SOx	0.1	19	0.01
CO_2	5438	1,984,924	992

* Average daily emissions calculated from total annual emissions and 365 days per year

Attachment 4: Data Center Emergency Generators Health Impacts and Modeling Information

1150 Walsh Ave. Data Center - 11 Emergency Generators
Source Parameters for Emergency Diesel-Fueled Generators

Source	Load	Stack* height (ft)	Stack Diam (in)	Temp (F)	Volume Flow (acfm)	Velocity (ft/min)	Velocity (ft/sec)
3,250 kW Generators No. 1 - 10	73%	30	26	741	20,629	5595	93.3
1,000 kW Generator No. 11	73%	14	14	814	6,370	5959	99.3
Source	**Load**	**Stack height (m)**	**Stack Diam (m)**	**Temp (K)**			**Velocity (m/sec)**
3,250 kW Generators No. 1 - 10	73%	9.14	0.660	667.0			28.42
1,000 kW Generator No. 11	73%	4.27	0.356	707.6			30.27

1150 Walsh Ave. Data Center, Santa Clara, CA
DPM Cancer Risks From 11 Emergency Generators
50 Hours Operation per Year per Unit
Maximum DPM Cancer Risk at Off-Site Residential Receptors
1.5 Meter Receptor Heights

Cancer Risk Calculation Method

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air $(\mu g/m^3)$
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values

Cancer Potency Factors $(mg/kg\text{-}day)^{-1}$

TAC	CPF
DPM	1.10E+00

	Infant/Child			Adult
Age -->	**3rd Trimester**	**0 - <2**	**2 - <16**	**16 - 30**
Parameter				
ASF	10	10	3	1
DBR* =	361	1090	572	261
A =	1	1	1	1
EF =	350	350	350	350
ED =	0.25	2	14	14
AT =	70	70	70	70
FAH =	1.00	1.00	1.00	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

MEI Cancer Risk From Emergency Generator Operation
1.5 meter receptor height

Exposure Duration (years)	Age	Age Sensitivity Factor	DPM Annual Conc (ug/m3)	DPM Cancer Risk (per million)
0.25	-0.25 - 0*	10	0.0027	0.04
2	1 - 2	10	0.0027	0.87
14	3 - 16	3	0.0027	0.96
14	17 - 30	1	0.0027	0.11
Total Increased Cancer Risk				**1.98**

* Third trimester of pregnancy

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M E M O

Date: May 10, 2018

To: **Brianna Bohonok** **b.bohonok@circlepoint.com**
Andrew Metzger
CirclePoint
200 Webster Street, Suite 200,
Oakland, CA 94607

From: James A. Reyff and William Popenuck
Illingworth & Rodkin, Inc.
1 Willowbrook Court, Suite 120
Petaluma, CA 94954

Subject: 1150 Walsh Data Center Generator Emissions – Santa Clara, CA
Job#18-075

Attached is a table showing the comparison of emissions from 3 different emergency generator sets. The emissions were calculated assuming 11 generators operating for 50 hours per year. The 3 types of generators evaluated were:

1) Caterpillar C175-16, 3,000 kW standby (Tier 2 engine) - total capacity of 33,000 kW (33 MW) for 11 generators
2) Cummins C3000 D6e, 3,000 kW standby (Tier 2 engine) - total capacity of 33,000 kW (33 MW) for 11 generators
3) Cummins C3250 D6e, 3,250 kW standby (Tier 2 engine) - total capacity of 35,750 kW (35.75 MW) for 11 generators

The project description states that there will be eleven 3,000 kW emergency generators. So, the first 2 cases consist of those size generators. However, the provided information also included some information for 3,250 kW generators. Note that information for the 3,000 kW Cummins generators was not provided, so, we obtained engine and emissions information for these generators from the Cummins website. For the Cummins 3,250 kW generators, only minimal information was provided by Circlepoint. We obtained engine and emissions information for these generators from the Cummins website. Complete engine and emissions information for the Caterpillar 3,000 kW generators was provided by Circlepoint and was used for this analysis.

For each type of generator set the following information is listed in the tables.

1) emission factors (grams per horsepower-hour, g/hp-hr) - from manufacturer data
2) calculated hourly emission rates per unit (pounds per hour, lb/hr)

3) total annual emissions in pounds per year (lb/year) and tons per year (ton/year) for 11 generators operating for 50 hours per year at full load (100% load)
4) average daily emissions (pounds per day, lb/day) for all 11 generators operating - calculated by dividing the total annual emissions by 365 days per year.

Two emissions scenarios were evaluated. The first was for nominal, or expected, emission rates from the manufacturers. The second was for potential, or maximum, emission rate from manufacturer information. Only the Caterpillar generators had potential emission rates available, so potential emissions for the Cummins generators were not calculated.

For NOx, probably the pollutant of greatest concern, emission rates from the Caterpillar 3,000-kW generator is highest. Regardless of generator selected, the air quality study will likely identify a limit to the number of hours and/or load factor to keep average daily emissions below 54 pounds of NOx. We will need to know the daily traffic trip generation rate for the project to set this limit for testing to keep NOx from exceeding the BAAQMD threshold.

1150 Walsh Ave Data Center
Comparison of Caterpillar and Cummins Emergency Generator Emissions

Nominal (expected) Emission Rates

							Total Facility Emissions (11 Generators)								
	Caterpillar C175-16 3,000 kW	Cummins C3000 D6e 3,000 kW	Cummins C3250 D6e 3,250 kW	Caterpillar C175-16 3,000 kW	Cummins C3000 D6e 3,000 kW	Cummins C3250 D6e 3,250 kW	Caterpillar C175-16 33.0 MW	Cummins C3000 D6e 33.0 MW	Cummins C3250 D6e 35.75 MW	Caterpillar C175-16 33.0 MW	Cummins C3000 D6e 33.0 MW	Cummins C3250 D6e 35.75 MW	Caterpillar C175-16 33.0 MW	Cummins C3000 D6e 33.0 MW	Cummins C3250 D6e 35.75 MW
Pollutant	Emission Factor* (g/hp-hr)			Hourly Emission Rate per Unit (lb/hr)*			Total Annual Emissions (lb/year)**			Total Annual Emissions (tons/year)**			Average Daily Emissions (lb/day)***		
NOx	6.07	5.20	5.70	59.19	49.39	59.10	32,554	27,163	32,505	16.28	13.58	16.25	89.2	74.4	89.1
HC (~ROG)	0.04	0.07	0.06	0.39	0.66	0.62	215	366	342	0.11	0.18	0.17	0.6	1.0	0.9
CO	0.34	0.20	0.30	3.32	1.90	3.11	1,823	1,045	1,711	0.91	0.52	0.86	5.0	2.9	4.7
PM10	0.03	0.01	0.05	0.29	0.12	0.52	161	68	285	0.08	0.03	0.14	0.4	0.2	0.8
PM2.5	0.03	0.01	0.05	0.27	0.12	0.49	151	64	267	0.08	0.03	0.13	0.4	0.2	0.7
SOx	-	-	-	0.05	0.04	0.05	25	24	26	0.01	0.01	0.01	0.1	0.1	0.1
CO2	-	-	-	4,771	4,654	5,057	2,623,891	2,559,893	2,781,423	1,312	1,280	1,391	7,189	7,013	7,620

* Nominal emission rates (Not maximum emission rates) at full (100%) load.
** Annual emissions are for operation of generators for 50 hours per year at full load.
*** Average daily emissions calculated from total annual emissions and 365 days per year

Generator Information and Source Data

Caterpillar C175-16 Mission Critical Emergency Generator (Tier 2 engine) - engine and emissions data provided by Circlepoint

Cummins C3000 D6e - 3,000 kW Emergency Generator (Tier 2 engine) - engine and emissions data obtained from Cummins website

Cummins C3250 D6e - 3,250 kW Emergency Generator (Tier 2 engine) - initial generator information provided by Circlepoint, detailed engine and emissions data obtained from Cummins website

Potential (maximum) Expected Emission Rates

							Total Facility Emissions (11 Generators)								
	Caterpillar C175-16 3,000 kW	Cummins C3000 D6e 3,000 kW	Cummins C3250 D6e 3,250 kW	Caterpillar C175-16 3,000 kW	Cummins C3000 D6e 3,000 kW	Cummins C3250 D6e 3,250 kW	Caterpillar C175-16 33.0 MW	Cummins C3000 D6e 33.0 MW	Cummins C3250 D6e 35.75 MW	Caterpillar C175-16 33.0 MW	Cummins C3000 D6e 33.0 MW	Cummins C3250 D6e 35.75 MW	Caterpillar C175-16 33.0 MW	Cummins C3000 D6e 33.0 MW	Cummins C3250 D6e 35.75 MW
Pollutant	Emission Factor* (g/hp-hr)			Hourly Emission Rate per Unit (lb/hr)*			Total Annual Emissions (lb/year)**			Total Annual Emissions (tons/year)**			Average Daily Emissions (lb/day)***		
NOx	7.29	-	-	71.09	-	-	39,097	-	-	19.55	-	-	107.1	-	-
HC (~ROG)	0.06	-	-	0.59	-	-	322	-	-	0.00	-	-	0.9	-	-
CO	0.60	-	-	5.85	-	-	3,218	-	-	(ton/yr)	-	-	8.8	-	-
PM10	0.40	-	-	3.90	-	-	2,145	-	-	0.00	-	-	5.9	-	-
PM2.5	0.37	-	-	3.65	-	-	2,010	-	-	0.00	-	-	5.5	-	-
SOx	-	-	-	0.05	-	-	25	-	-	0.00	-	-	0.1	-	-
CO2	-	-	-	4,771	-	-	2,623,891	-	-	0	-	-	7,189	-	-

* Potential emission rates at full (100%) load.
** Annual emissions are for operation of generators for 50 hours per year at full load.
*** Average daily emissions calculated from total annual emissions and 365 days per year

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MEMO

Date: September 4, 2018

To: **Andrew Metzger**
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From: James A. Reyff
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RE: 1150 Walsh Data Center – Santa Clara, CA

SUBJECT: Generator Comparison – Air Quality Job#18-075

This memo compares emissions from three potential generator types considered for the 1150 Walsh Data Center Project. Our air quality study[1] for the project evaluated the emissions and health risks associated with routine testing/maintenance operation of ten 3,250 kW Cummins Generator Sets C3000 D6e and one 1,000 kW Cummins Generator Set 1000QFAD.

The comparison was made of average daily emissions at 73% load and engine/stack parameter information for the current Cummins generators (10 at 3,250 kW and one at 1,000 kW) with similar MTU and Kohler emergency generators (see attached spreadsheet). This evaluation was based on the information that was provided to us on August 6, 2018. Based on the emissions comparison, the current project generators evaluated in the air quality study (i.e., Cummins engines) would, overall, be considered the worst-case scenario. This is because the NOx emissions, which are closest to the significance threshold, are highest. The engine and stack parameters are pretty much the same as those analyzed, so we wouldn't expect significant differences in modeling DPM impacts considering the relatively large distance to the nearest sensitive receptor. In addition, the health risk assessment did not consider the potential benefit (in reducing DPM) from use of diesel particulate filters (DPFs). That effect was not considered in the original risk evaluation in order to be conservative and since the DPFs may not be entirely effective in reducing PM during startup conditions and for short periods of operation.

[1] Illingworth & Rodkin, Inc. 2018. *1150 Walsh Avenue Data Center Project in Santa Clara, CA – Air Quality and GHG Emissions Assessment*. August 1.

Issues to note:

1. Information for a 1,000 kW Kohler generator was not provided, so the Kohler total generator emissions were assumed to include the highest of the Cummins and MTU generators presented for that size.

2. The emissions data for the 3,250 kW Kohler generator engine (Kohler KD3250 Additional Emissions INFO.xlsx) were stated to be in units of ***gallons*** per kilowatt hour (g/kwh), which appears incorrectly stated and the emissions we interpreted as for grams per kilowatt hour (g/kWh).

3. The PM10/PM2.5 emissions listed in the comparison spreadsheet, and in the report for 1150 Walsh, do not include the effect of use of DPFs. Actual emissions when using DPFs would be much lower than those reported and used in the health risk evaluation.

4. The 3,250 kW Kohler generator has PM10 emissions about 3 times greater than the Cummins or MTU generators. However, overall PM10 emissions are very low and this difference is not significant from an average daily emissions standpoint. For the cancer risk, the current Cummins generators had a maximum increased cancer risk of 2 in one million. This risk would increase by a factor of about three with the Kohler generators, but would still be below the significance threshold. Additionally, the effects of using DPFs were not included when calculating the original project cancer risk of 2 in one million. So the use of DPFs for this generator may be more important.

In summary, the Kohler and MTU generators would be anticipated to result in similar air quality impacts. While levels, in terms of emissions and resulting contaminant concentrations may vary, the conclusion regarding air quality impacts would be similar. That is, less than significant emissions and health risk impacts, assuming the number of generators does not increase above what was anticipated for the project evaluated.

Attachment: 1150 Walsh Data Center - Generator Emissions and Stack Parameter Comparison

Attachment

1150 Walsh Data Center - Generator Emissions and Stack Parameter Comparison

<u>Comparison of Average Daily Emissions at 73% Load*</u>

Ten 3,250 kW Generators

	Average Daily Emissions (lb/day)		
Pollutant	**Cummins**	**MTU**	**Kohler**
NOx	46.7	41.6	37.0
HC	0.9	1.5	3.1
CO	2.1	5.4	20.8
PM10	0.5	0.46	1.54
PM2.5[3]	0.5	0.345	1.15
SOx[1a]	0.0	0.048	0.054
CO_2[1b]	5,272	5,080	5,725

One 1,000 kW Generators

	Average Daily Emissions (lb/day)		
Pollutant	**Cummins**	**MTU**	**Kohler**
NOx	1.3	1.6	-
HC	0.0	0.0	-
CO	0.2	0.1	-
PM10	0.04	0.006	-
PM2.5[3]	0.04	0.005	-
SOx[1a]	0.002	0.002	-
CO_2[1b]	166	203	-

All Generators

	Average Daily Emissions (lb/day)		
Pollutant	**Cummins**	**MTU**	**Kohler****
NOx	47.9	43.2	38.5
HC	1.0	1.5	3.1
CO	2.2	5.5	20.9
PM10	0.56	0.47	1.5
PM2.5[3]	0.52	0.35	1.15
SOx[1a]	0.05	0.05	0.06
CO_2[1b]	5,438	5,284	5,929

* Daily averate emissions based on operation of 50 hours per year and averaged over 365 days per year.

** Emissions for Kohler generators inclue emissions from ten Kohler 3,250 kW generators and one MTU 1,000 kW generator.

Comparison of 3,250 kW Engine/Stack Parameters at Full (100%) Load

Manufacturer	**(hp)**	**Temp (F)**	**Volume Flow (m3/s)**	**Volume Flow (acfm)**	**Fuel Use (gal/hr)**
Cummins	4,703	874	-	24,590	216.6
MTU	4,680	923	11.7	24,791	223
Kohler	4,680	912	-	25,109	217